the OIL AND GAS JOURNAL

OCTOBER 17, 1955

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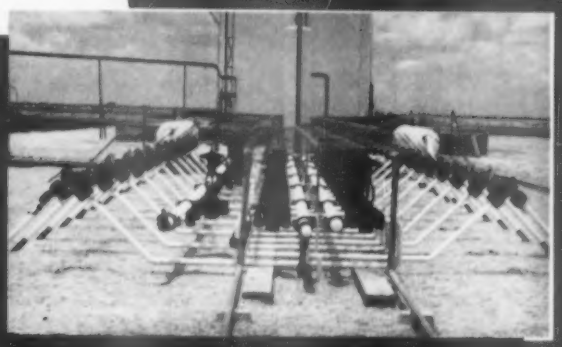
Preventive Maintenance for PEOPLE . . . It's Paying off for Magnolia . p. 84

Record New Demands Behind Strike Threat at Gulf's Huge Port Arthur Refinery p. 94



Automation...

Cuts lease-operating time 85 per cent

P. 111

T.G.T. Asks Permit for Nashville to Canada Gas Line • p. 90

When you want

BETTER PERFORATING

listen to what operators say:

"Even on tough jobs, Lane-Wells perforating gets results for me."

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A glance ahead . . . at press time

These trends will make TOMORROW'S NEWS

The industry is entering the season of highest consumption, and refiners are scanning weather forecasts as a key to trends in refinery runs and distillate stocks.

Regardless of winter weather, industry economists anticipate a continued increase in domestic demand next year. Preliminary forecasts are mostly in the range of 3.5 to 4.5 per cent above 1955.

Sales of natural gas for industrial purposes are being discouraged and handicapped by FPC in various small ways which could add up to indirect "end-use control."

Idea seems to be to make more gas available to residential and other "preferred" uses, but transmission companies say it will raise costs to homeowners.

There's a slight shifting—which could develop into a trend—away from fracturing and reworking of old wells and excessive development work which resulted in abnormal gains in productivity but very small additions to reserves. Companies wanting to improve their long-range reserves position are putting more emphasis on exploration.

Drilling footage next year should be up between 2 and 4 per cent, according to studies based more on correlation with producers' income than on actual company programs. Total expenditures for drilling may show higher increase, due to more wildcatting and offshore work.

Crude-price hike in Illinois basin looks as if it's going to stick, making it most significant news for producers in many months.

It should trigger a boost in Alberta field prices and stiffen market for Mid-Continent crudes. There will be talk of a general increase in crude prices, but don't expect action for several months.

Stanolind Oil & Gas Co., just starting major exploration in Cuba, may soon extend operations to another Caribbean island—Jamaica. Reports have Stanolind ready to join Base Metals Mining Corp.'s Jamaican venture which calls for 16 exploratory wells on a 5,000,000-acre concession. Since entering Cuba, Stanolind has been deluged with foreign wildcat propositions.

Some oil companies are remaining alert to the commercial possibilities of mineral deposits on oil leases. For some, profit of mining these minerals could rival oil production. Uranium is receiving a big play but other fields to watch are potash, gypsum, and other rare metals.

the OIL AND GAS JOURNAL

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TECHNOLOGY—OPERATION

Shell's West Texas Automatic-Lease System 111

By D. C. Meyers

Shell-operated leases in Wasson field, Yoakum County, Texas, are fully automatic. Time required to operate a lease is reduced as much as 85 per cent. This greatly increases the productivity of each lease switcher. Equipment used includes time-cycle controls, automatic tank filling and emptying, instruments to record crude physical properties, and safety devices.

Colorado Interstate Uses New Techniques to Build Gas Pipeline 118

By Robert G. Deering

Some unusual practices in design and construction are features of the 140-mile, 22-in. gas pipeline being laid by Colorado Interstate Gas Co. A strong light-wall pipe is being used. The ditch is extra deep. Casing will be vented from the bottom. Colorado is also using extra care in coating and employing a high percentage of weld X-rays.

High-Alumina Catalyst Proves Beneficial in Commercial Test 121

By O. A. Wunderlich, J. J. Prichard, and F. Emerson Ivey, Jr.

A fluid-cracking catalyst containing 25 per cent alumina has demonstrated greater structural and catalytic stability than 13 per cent alumina catalyst in a commercial plant test.

Here's West Texas' Deepest, Toughest Drilling 126

By Ed McGhee

Puckett field in Pecos County, Texas, is the deepest production in West Texas, but most of the trouble in drilling its wells comes in shallow formations. Cavernous and crooked-hole zones near the surface slow drilling and make it expensive. This article gives data on drilling conditions, mud and casing programs, and bit records.

Gas-Electric Rig Provides Stiff Competition 128

By Norman S. Morrisey

The value of gas-electric drilling equipment is being proved in Headlee field, Ector County, Texas. Ten days have been cut from normal drilling time in the field.

S.E.G. Digests 129

The Society of Exploration Geophysicists met October 3-6 in Denver. Here are abstracts of the important oil papers presented at that meeting.

How Slim Can a Slim Hole Be? 131

By Alfred O. Fischer

"If the problem of artificial lift is to be the limiting factor, then ample evidence is available that casing size can be reduced to 2½ or even 2-in."

How Big a Drill Collar to Straighten Out Crooked Holes? 133

By M. M. Brantly and Stanley C. Moore

Hole deviation is the greatest obstacle to drilling progress in Russell-Devonian field, Gaines County, Texas. The most important single factor in achieving high penetration rate is a properly designed drill-collar assembly just above the bit. Data in this article show that the work of Woods and Lubinski is the most practical guide for designing this assembly.

On-The-Job: In the Fields—How to Keep a "Buttery" Crude Moving 137

By D. H. Stormont

A casing-type free pump using 140° F. power oil keeps the crude in Shell's eastern Nevada wells from congealing in the gathering system . . . other operating ideas.

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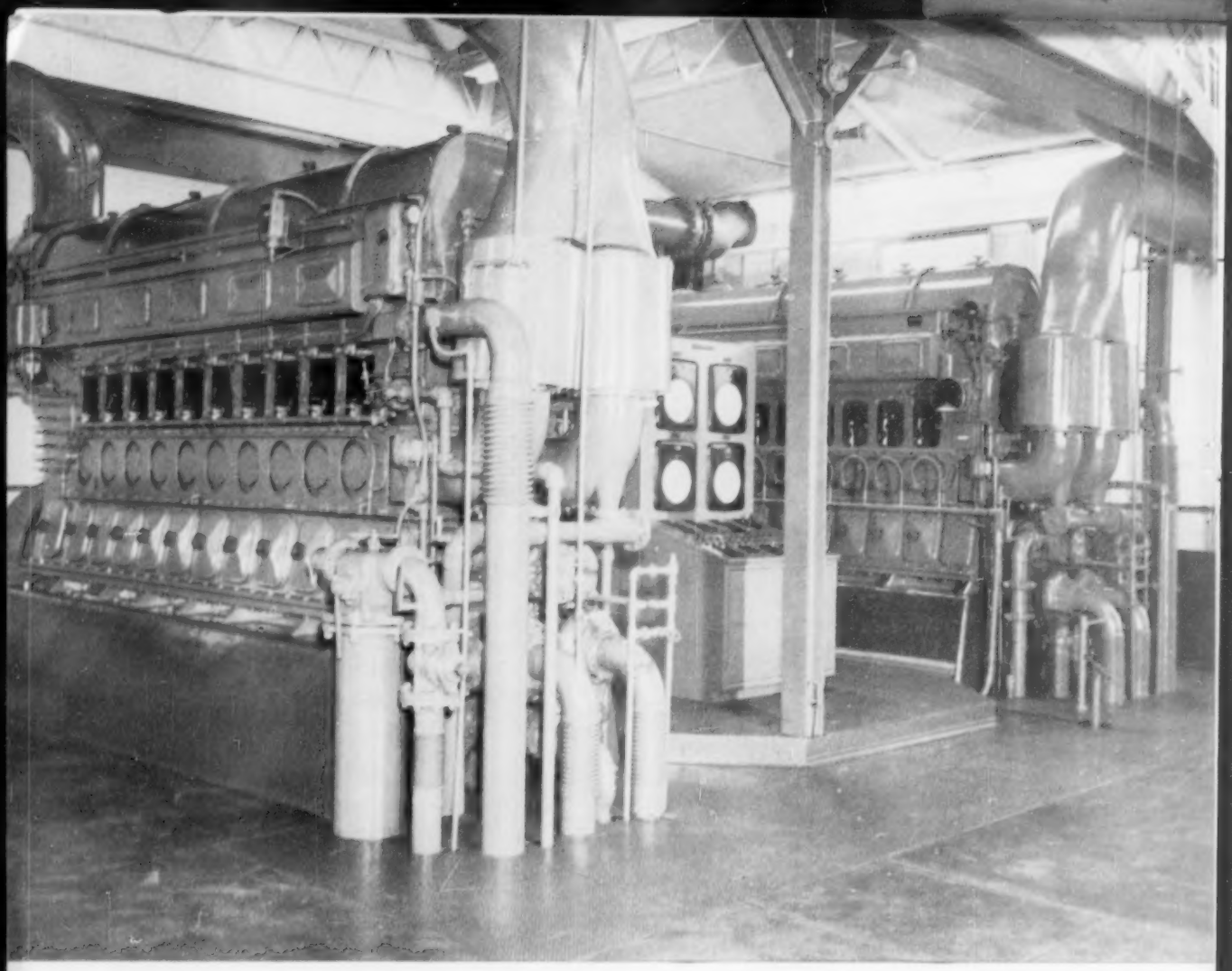

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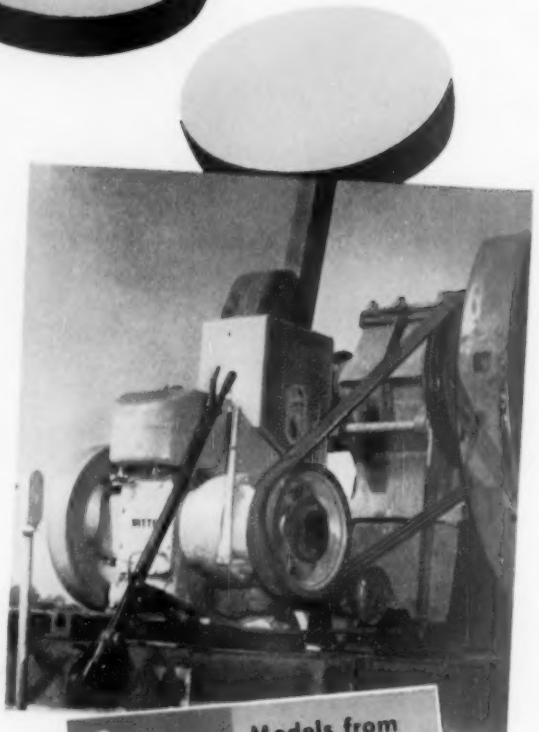

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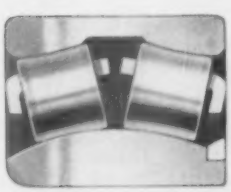

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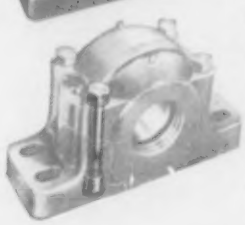

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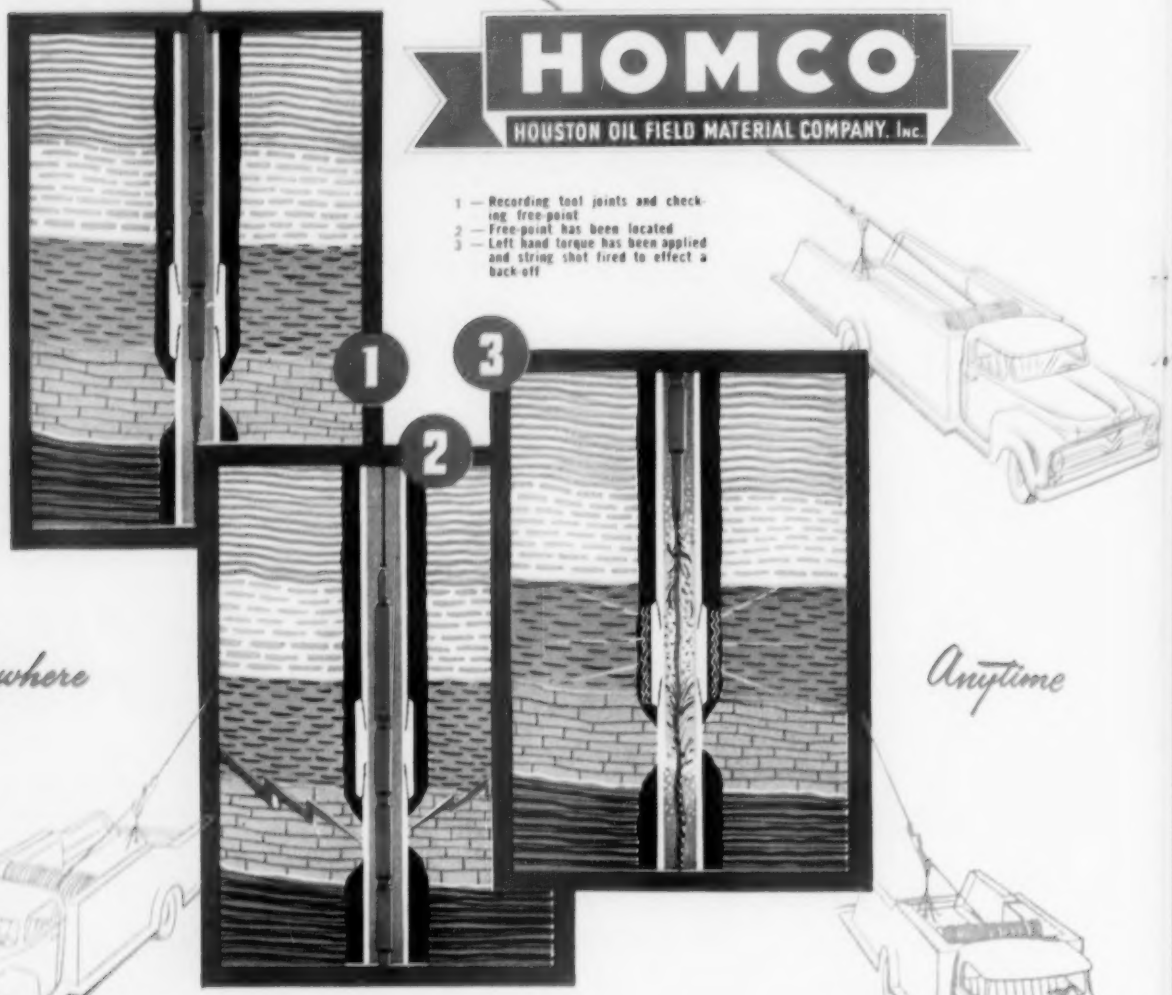
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1
2
3

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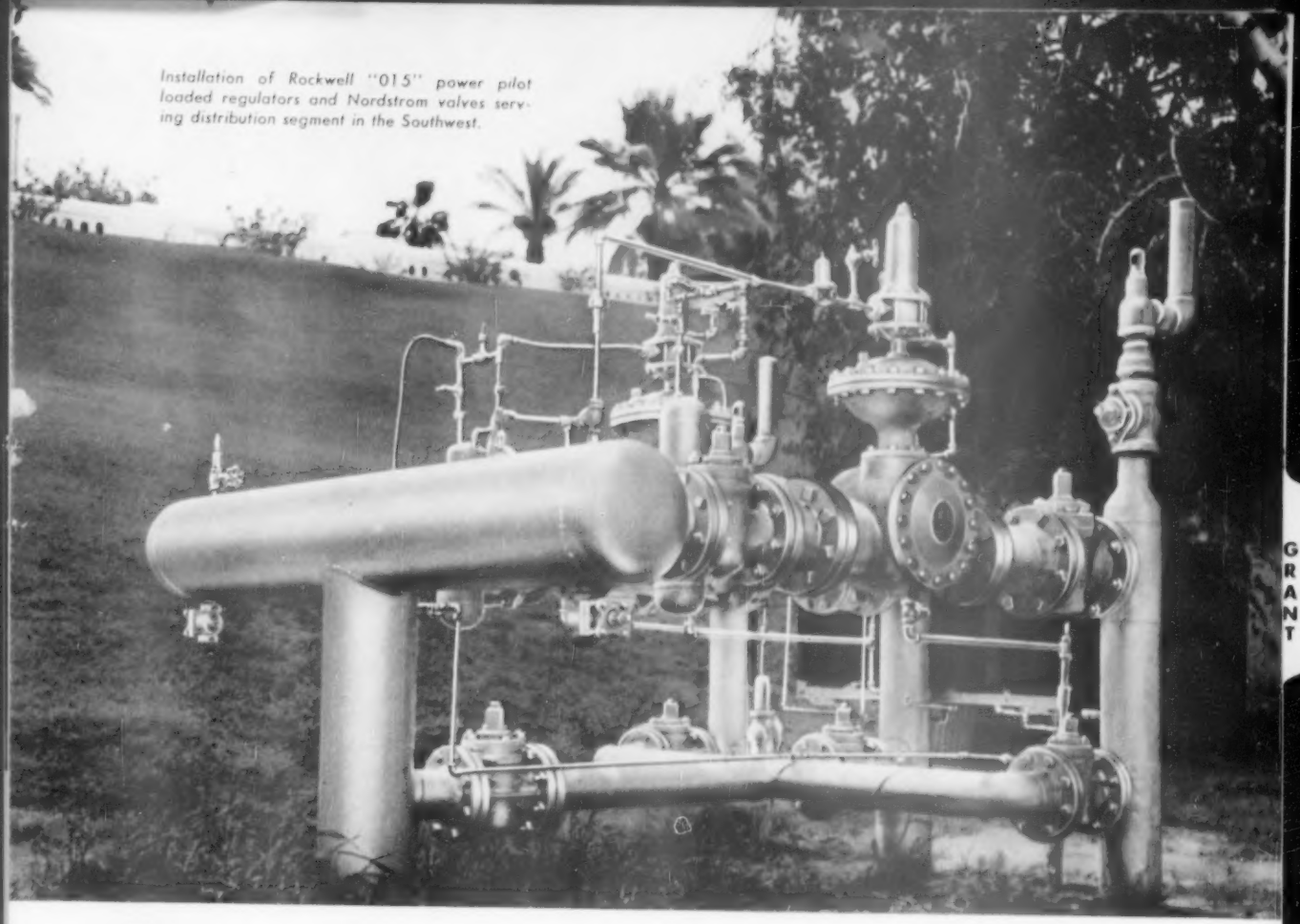
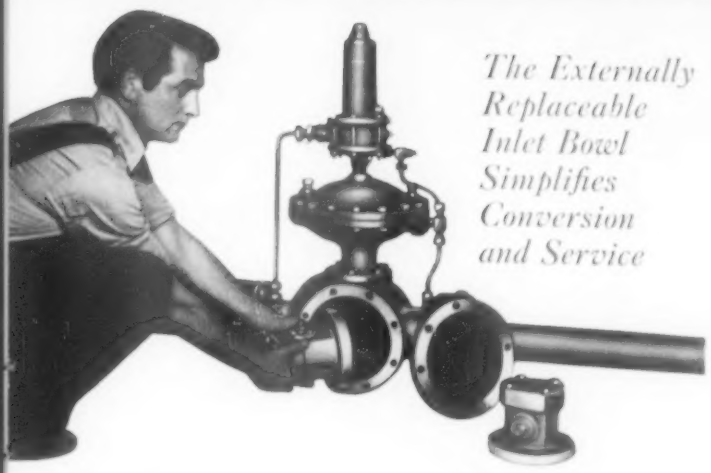


Installation of Rockwell "015" power pilot loaded regulators and Nordstrom valves serving distribution segment in the Southwest.



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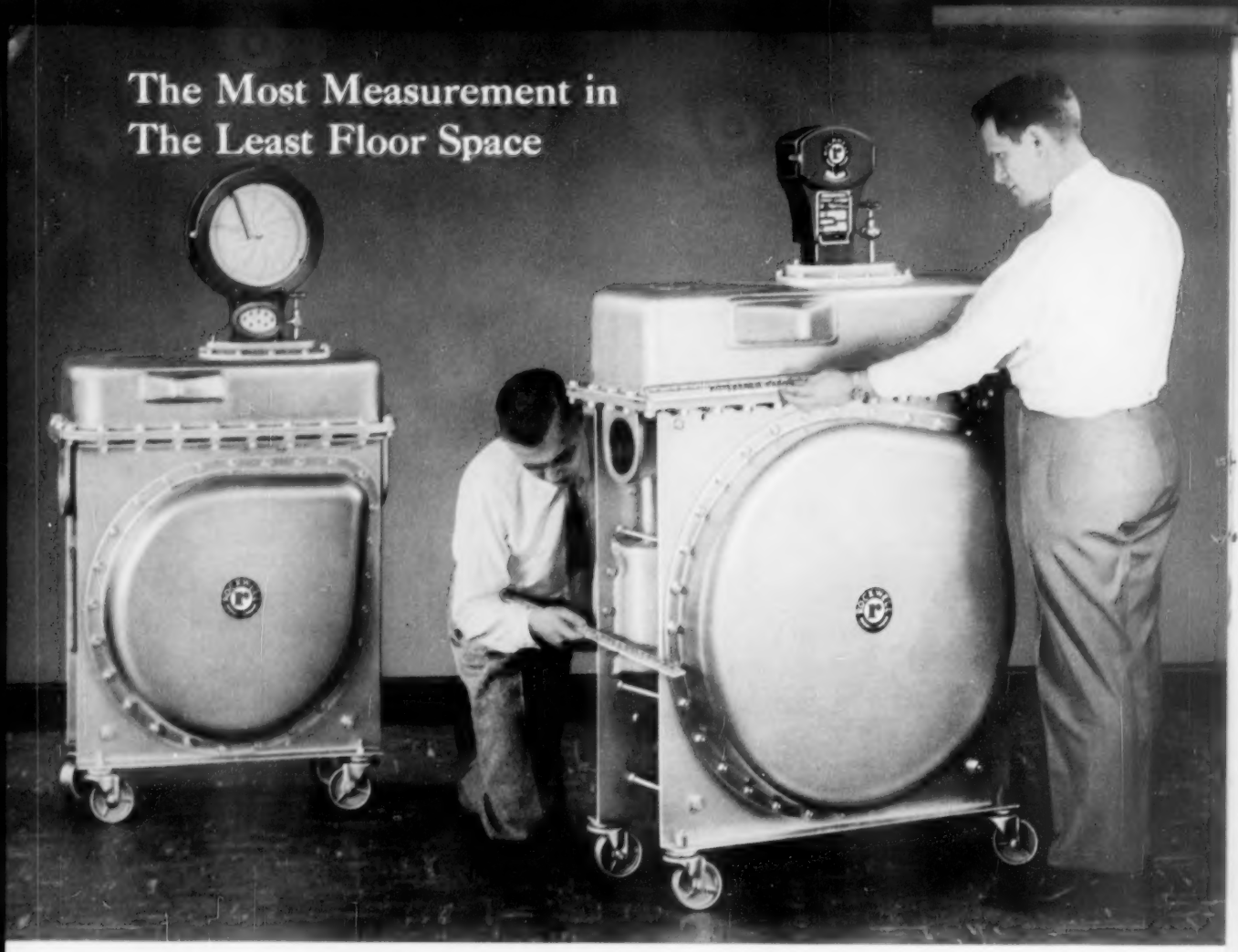

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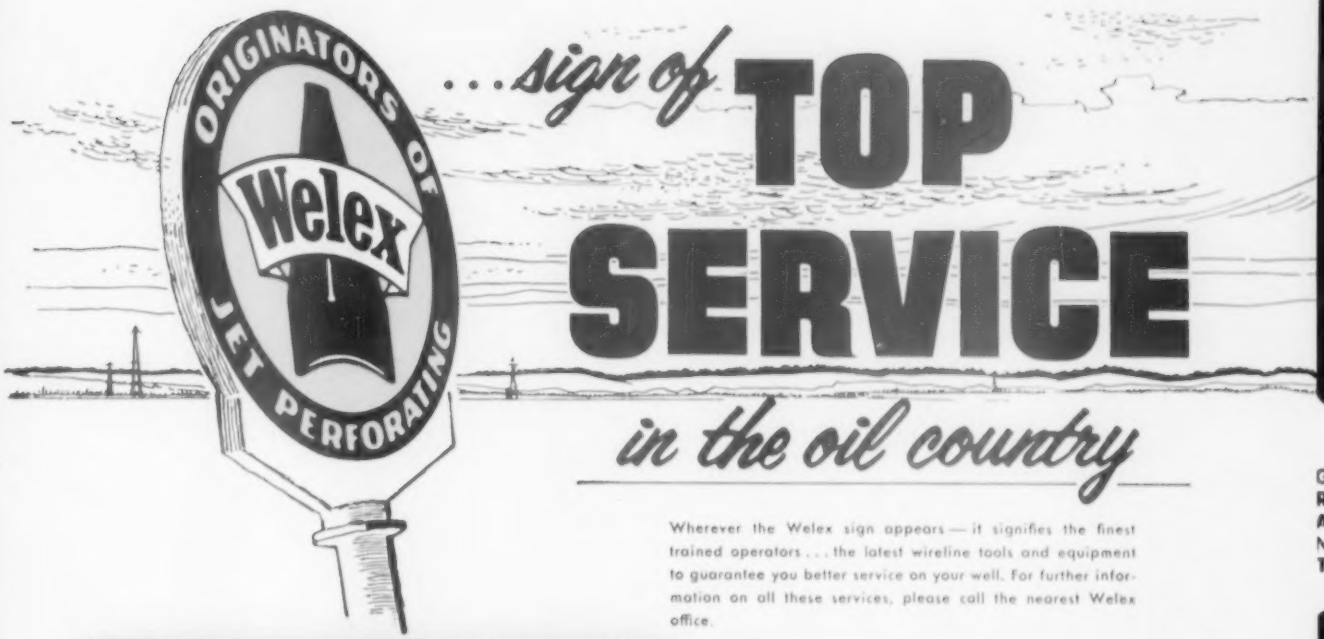

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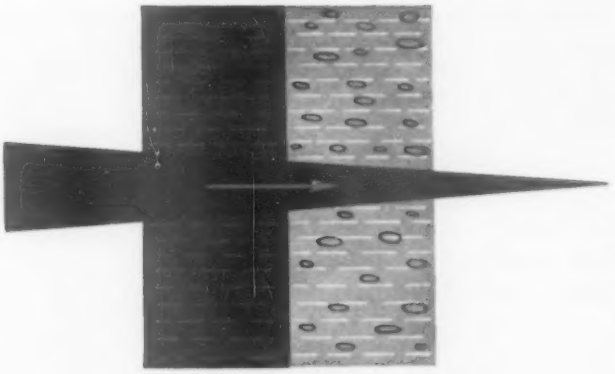

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HALLIBURTON'S

FAST ACTING HYFLO

Water block and water-oil emulsions are broken, chemically, with Halliburton's Hyflo — and with only 1 to 2 hours shut-in time. By thus decreasing flow resistance, well production is boosted.

Hyflo is an improved chemical agent for eliminating water and emulsion blocks to increased production in normal or fractured formations. It is a surfactant that efficiently reduces surface tension of water and destroys viscous emulsions that may be formed by formation crudes or fracturing fluids. Hyflo solution in a well contacts free waters in the formation and water imprisoned in an emulsion. Surface tension of this water is reduced over 50 per cent which lowers the Jamin effect and gives far less resistance to flow where gas and fluid are intermingled in capillary channels. Laboratory data in the following chart has been substantiated in continuing field use:

CONCENTRATION HYFLO	SURFACE TENSION	
	SALT WATER	FRESH WATER
0.025%	31 dynes per cm.	32.7 dynes per cm.
0.0125%	31.8 dynes per cm.	33.6 dynes per cm.

By reducing flow resistance you can realize greater production. Use Hyflo as a straight treatment or as a technique for obtaining better fracturing results. Call your local or district office of the Halliburton Oil Well Cementing Company.

COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File.

HALLIBURTON

CHEMICAL SERVICES

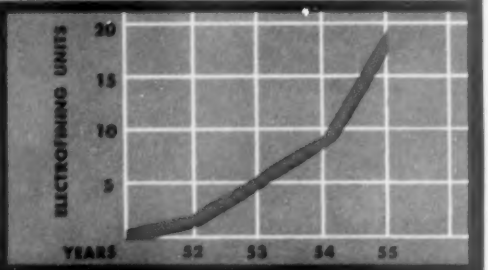
250 SERVICE CENTERS — JUST MINUTES AWAY FROM ANY RIG

GRANT

WHY THE ACCELERATING INTEREST IN ELECTROFINING

In 1950 the first Petreco Electrofining* Unit was installed. Now there are 18 Electrofiners installed and — at the last count — six more under construction and on order.

**Petreco Electrofining is a compact, automatic, fast treating process for continuously contacting a light hydrocarbon stream with a treating agent, then rapidly separating the chemical from the treated product.*



THIS TABLE SHOWS THE WIDE ACCEPTANCE AND APPLICABILITY OF *ELECTROFINING*.

ELECTROFINING INSTALLATIONS

Refinery Location	Electrofining Treatment	Number of Units	BPD Capacity	Stock Treated
California	Acid	1	16,000	Light Pressure Distillate
California	Acid	4	9,600	Lube and Spray Oils
Indiana	Caustic	1	10,000	Blended light cycle oil and straight run naphtha
Kansas	Doctor	1	11,000	Straight run and cracked gasoline
Pennsylvania	Caustic**	1	12,500	Gasoline
Pennsylvania	Caustic**	1	3,600	Gasoline
Texas	Caustic**	2	5,000	Thermally cracked distillate
Texas	Caustic**	2	5,000	Cat distillate
Texas	Caustic**	3	30,000	Cat distillate
Texas	Acid	1	4,430	Lube Oil
Texas	Sulfonation	1	2,000	Virgin distillate
Texas	Dewatering	2	6,000	Vacuum Tower Gas Oil

**Caustic Scrub and Water Wash

Additional Electrofiners are under construction or on order for refiners in Canada, Pennsylvania, New York, Ohio, and New Jersey.

HERE ARE THE REASONS WHY MORE AND MORE REFINERS ARE SPECIFYING ELECTROFINING FOR LIGHT OIL TREATING:

1. Compact
2. Continuous
3. Precision Controlled
4. Minimum Carry-over
5. Less Treating Chemical Used
6. Eliminates Haze Stabilizers
7. Fast-Tower to Market
8. Efficient—Removes Tarry Acids, Spent Caustic, Metals, Mercaptans and other Impurities
9. Flexible—Single, Dual, Two Phase Units Available
10. Automatic—Minimum Operating Attention Required
11. Costs Less than any Comparable Process

For complete information, call or write

PETRECO

A DIVISION OF PETROLITE CORPORATION

3202 South Wayside Drive, Houston 1, Texas

1390 East Burnett St., Long Beach 6, California

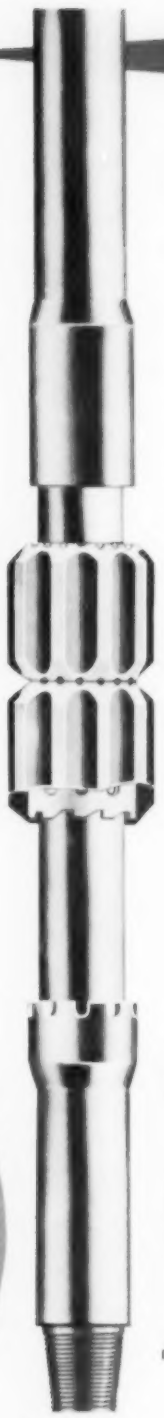
PETRECO®

BT10

GRANT

GRANT
BIT TOOL COMPANY

Effective Drill String Stabilization with this GRANT CUSHION STABILIZER drills FASTER hole CHEAPER



Cushion Stabilizer

YOU KNOW that one of the best ways to reduce cost per foot of hole is to boost rate of penetration. And one of the best ways to boost rate of penetration is to stabilize your string against shock loads and lateral movement of the drill collars or pipe.

The tool for this job is the new Grant Cushion Stabilizer, and here's why:

MORE WEIGHT ON BIT

The Grant Cushion Stabilizer permits up to 80% more weight on the bit without increasing hole deviation. There's where you can top *any* previous unstabilized penetration rates in similar formation!

STRAIGHTER HOLE

Because the Grant keeps collars centered yet rotating freely, similar to a bearing around a shaft, you can drill straighter hole with more weight. At the same time, you protect your string and add to its useful life.

Placed at the proper points in your drill collar string, the Grant Cushion Stabilizer absorbs lateral movement while allowing collars to rotate freely on tough, fluid lubricated rubber. Since the rubber boots do not turn in the hole, there is no tendency for them to ball up or restrict full circulation. If washover operations are required, the boots lock to the body of the tool—an important safety point.

YOU CAN USE THE GRANT CUSHION STABILIZER

- **for maximum stabilization of the drill collar string**
- **to keep collars from rubbing the wall in high angle hole**
- **as crossover subs between drill collars and drill pipe**
- **for gaining or losing angle, as desired**
- **preventing metal-to-metal contact while drilling out of top hole casing.**

Model 1530 Regular Reamer | Underreamer | Model 1540 Wall Scraper | Driltblade Stabilizer | Model 6480 A Reamer Near Bit Type

For details, talk with your nearby Grant field man, or write direct for Bulletin 63. Learn how you can cut cost-per-foot with drill string stabilization—by Grant!

GRANT
OIL TOOL COMPANY

New Office and Plant: 2042 East Vernon Avenue, Los Angeles 58, California

CALIFORNIA—Ventura—Phone Mutual 3-6767
Avenal—Phone 228
Bakersfield—Phone FAirview 5-0507
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Houston—Phone Mission 4-0627
LOUISIANA—Lafayette—Phone 8-7543
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CANADA—Edmonton—Phone 39-2233
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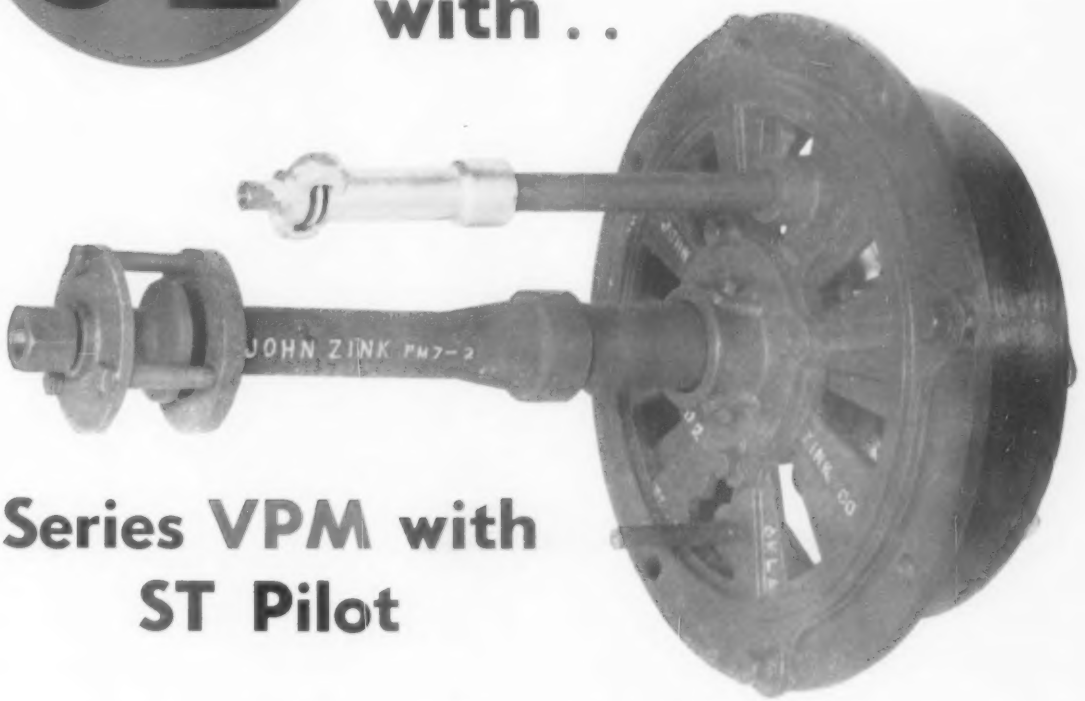
JOHN ZINK JZ

burn gas of high hydrogen content with . .



Series VPM with ST Pilot

Satisfactorily burns 100% free hydrogen. The Series VPM is an adaptation of the ever popular John Zink BI-MIX Burner. It is available for either horizontal or vertical firing. The Series VPM burns with a short crisp flame with primary door open.

It can be switched from a high hydrogen gas fuel to natural gas.

The JZ SMOKELESS FIELD FLARE BURNER is designed to handle the problem of waste and dump gases by providing combustion without smoke. It is a complete assembly easily attached to any flare line or stack.

Write for JZ Burner Catalog

JOHN ZINK COMPANY

4401 So. Peoria **Tulsa, Oklahoma**

SURFACE ACTIVE AGENTS • ETHANOLAMINE EMULSIONS • TEXTILES • COSMETIC
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ETHANOLAMINE EMULSIONS • TEXTILES • COSMETICS • INDUSTRIAL METAL
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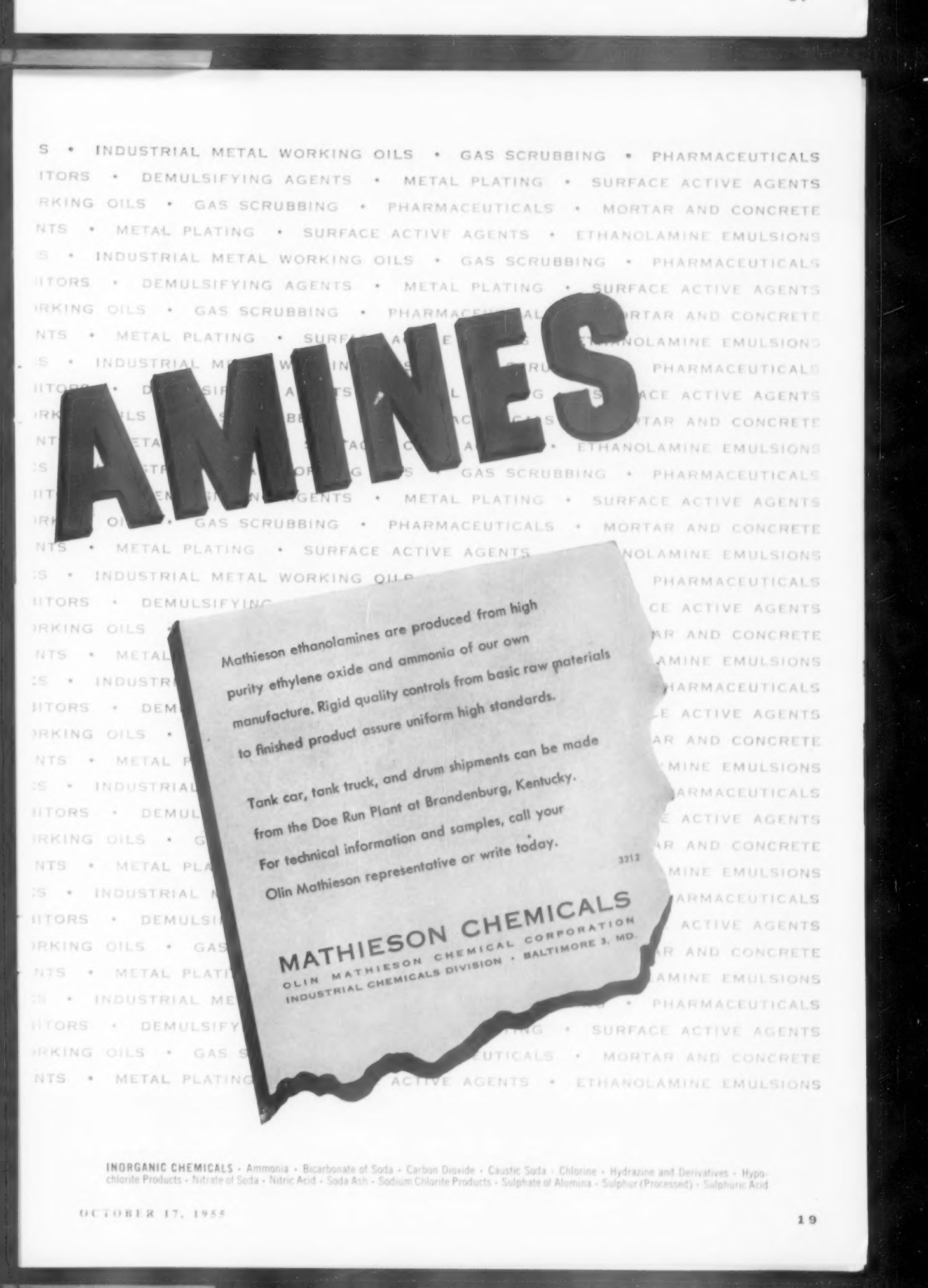
ORGANIC CHEMICALS - Ethylene Oxide - Ethylene Glycols - Polyethylene Glycols - Glycol Ether Solvents - Ethylene Dichloride - Dichloroethylether
Formaldehyde - Methanol - Sodium Methylate - Hexamine - Ethylene Diamine - Polyamines - Ethanolamines - Trichlorophenol - Trichlorobenzene


AMINES
Mathieson ethanolamines are produced from high purity ethylene oxide and ammonia of our own manufacture. Rigid quality controls from basic raw materials to finished product assure uniform high standards.
Tank car, tank truck, and drum shipments can be made from the Doe Run Plant at Brandenburg, Kentucky.
For technical information and samples, call your Olin Mathieson representative or write today.
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OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

INORGANIC CHEMICALS - Ammonia - Bicarbonate of Soda - Carbon Dioxide - Caustic Soda - Chlorine - Hydrazine and Derivatives - Hypochlorite Products - Nitrate of Soda - Nitric Acid - Soda Ash - Sodium Chlorite Products - Sulphate of Alumina - Sulphur (Processed) - Sulphuric Acid

LUFKIN continues to maintain its leadership in the pumping unit field with the NEW C LINE

OF IMPROVED CRANK BALANCED UNITS

OVER 40 SIZES RANGING FROM 4000 LB. POLISHED ROD CAPACITY AND 10,000 IN. LB. PEAK TORQUE TO 30,000 LB. POLISHED ROD CAPACITY AND 640,000 IN. LB. PEAK TORQUE

STANDARD ASSEMBLIES

	C-640DB-144-30	
	C-640DB-120-30	
	C-640DB-108-30	
	C-456DB-144-30	
	C-456DB-120-30	
	C-456DB-108-30	
*	C-320D-120-25	
	C-320D-84-30	
	C-320D-84-27	
	C-320D-74-27	C-114DA-54-16A
	C-320D-74-25	C-114DA-54-15
	C-228D-74-27	C-114DA-54-14
	C-228D-74-23	C-114DA-54-13.5
	C-228D-74-20	C-114DA-48-14
	C-228D-64-23	C-114DA-42-10.5
	C-228D-64-20	C-80DB-48-14
	C-160D-74-20	C-80DB-42-10.5
	C-160D-64-23	C-57D-48-10
	C-160D-64-15	C-57D-42-10.5
	C-160D-54-18	C-40D-40-7.4
	C-160D-54-17	C-40D-34-8
	C-114DA-64-15	C-25D-28-6
	C-114DA-54-17	C-25D-24-6

These Units Are Also Available With Single Reduction Gear Reducers

The new "C" series offers a greater variety of combinations of torque, counter-balance and polished rod capacity to suit any conceivable well condition.

LET YOUR LUFKIN REPRESENTATIVE ASSIST IN SELECTING THE PROPER AND MOST ECONOMICAL UNIT FOR YOUR REQUIREMENTS.

EXPLANATION OF UNIT DESIGNATION

* C —For Crank Counterbalance

320D—Gear Reducer (320,000 Lb. In. Peak Torque Double Reduction)

120 —Maximum Stroke (120 Inches)

25 —Peak Polished Rod Capacity (25,000 Lb.)

Lufkin FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch Sales and Service: Houston • Dallas • New York • Tulsa • Los Angeles • Seminole • Oklahoma City • Corpus Christi • Odessa • Kilgore • Wichita Falls • Casper, Wyoming • Great Bend, Kansas • Effingham, Illinois • Sterling, Colorado • Lafayette, Louisiana • Bakersfield, California • El Dorado, Arkansas

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, EDMONTON, ALBERTA, CANADA

MURPHY DIESELS

are rugged, dependable, economical

Says:

John S. Hagestad
Hagestad Drilling Company
Bakersfield, California

Another in the growing list of satisfied Murphy Diesel owners is John S. Hagestad, drilling contractor of Bakersfield, Cal. He reports his experience as follows:

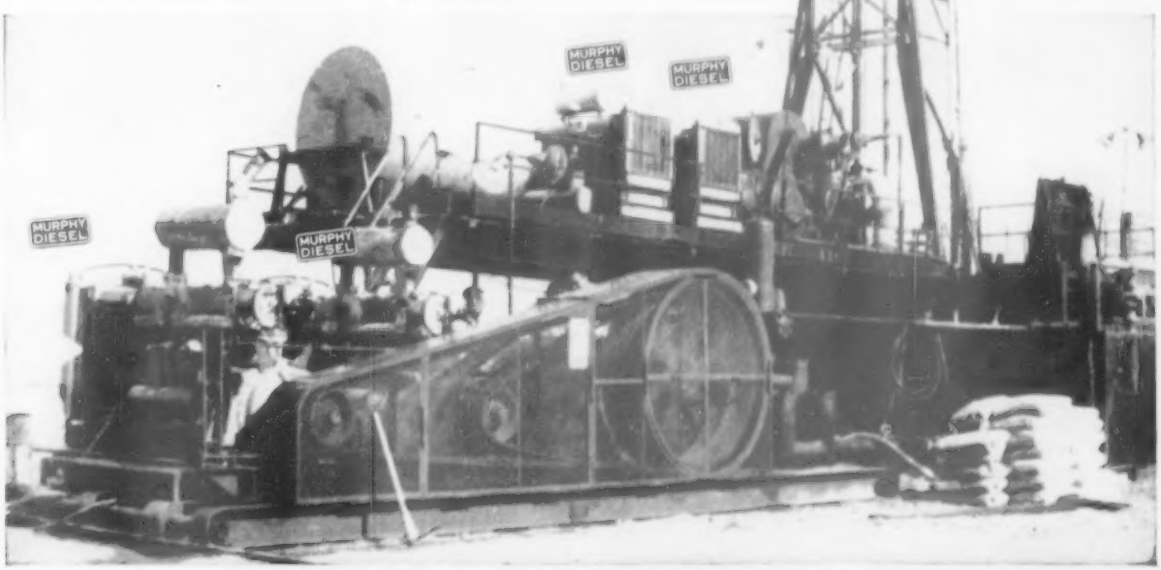
"The two Model 20 G Dual Fuel Murphy Diesels on our new Emsco G. B. 350 drawworks have performed satisfactorily in every respect. Our entire crew is pleased with their ruggedness and dependability which are most suitable for oilfield operation. We have already observed economy in fuel savings.

"We also have two Model 220 G Murphy Dual Fuel engines driving our D-300 Emsco Pump (7¼ - 14") at 70 strokes per minute. Under these conditions pressures and volume are ample for jet bit drilling."

Mr. Hagestad has demonstrated his sincerity with an order for four more Murphy Diesels. This is real proof of satisfaction. You, too, can get this same kind of satisfaction. The first step is to ask your Murphy Diesel Dealer to show you what Murphy Diesel Power can do for you.

MURPHY DIESEL CO. | 5305 W. Burnham St. Milwaukee 14, Wisconsin

Murphy Diesel Engines and Power Units are available in sizes from 96 to 248 H.P. Dual Fuel engines from 144 to 221 H.P. Generator Sets, 60 to 155 K.W.



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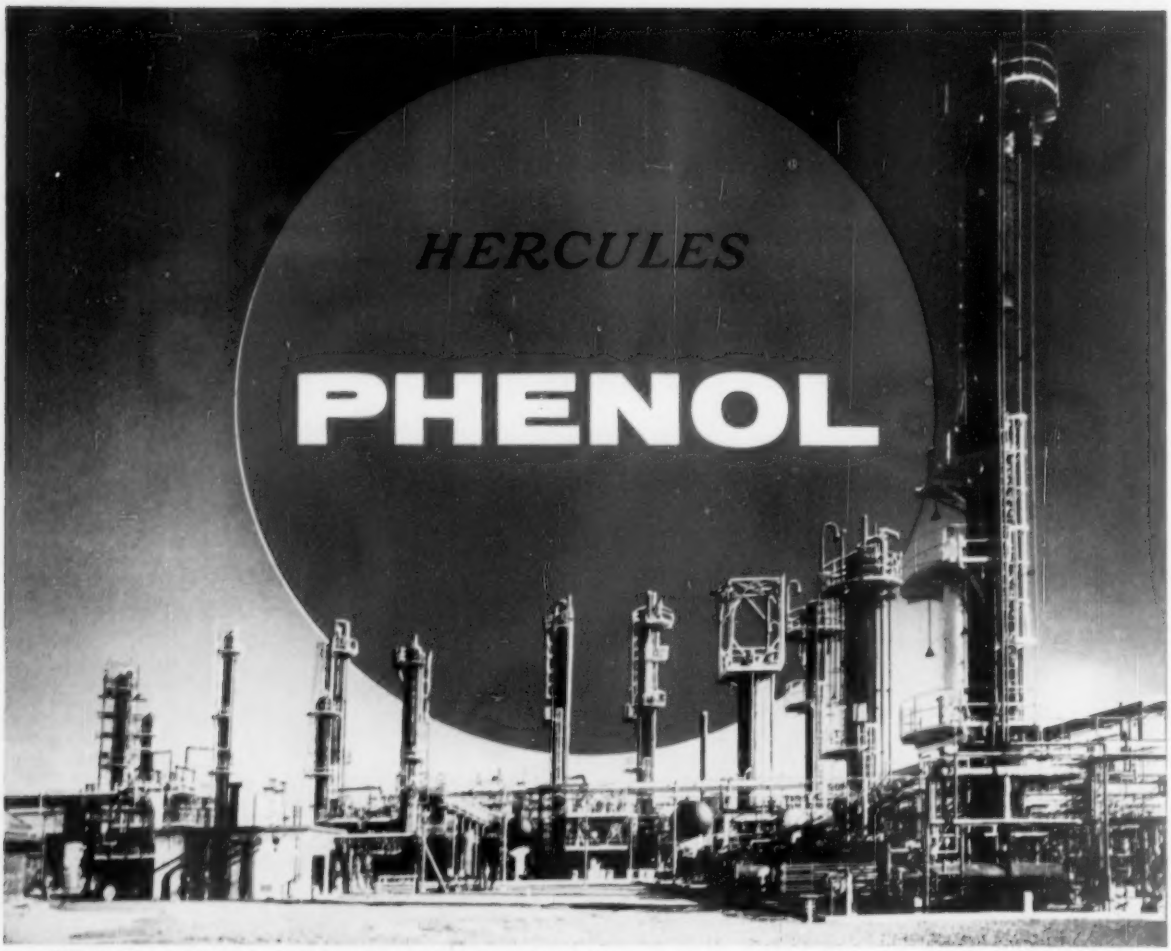
SEE YOUR MURPHY DIESEL DEALER, TODAY—

ALBUQUERQUE, NEW MEXICO, Lively Equipment Company; BUTTE, MONTANA, Hall-Perry Machinery Company; CORPUS CHRISTI, TEXAS, Houston Engine & Pump Company; DALLAS, TEXAS, Conley-Lott Machinery Co.; DENVER, COLORADO, Macdonald Equipment Co., Inc.; EDMONTON, ALBERTA, CANADA, Northern Engine & Equipment Co., Ltd.; GREAT BEND, KANSAS, Manufacturers Dist. Co.; GREAT FALLS, MONTANA, Hall-Perry Machinery Company; HOUSTON, TEXAS, Houston Engine & Pump Co., Inc.; JACKSON, MICHIGAN, Utility & Industrial Supply Co.; LOS ANGELES, CALIFORNIA, Industrial Engine Service; LUBBOCK, TEXAS, Conley-Lott Machinery Co.; SAN ANTONIO, TEXAS, The Roy Klossner Company; BAKERSFIELD, CALIFORNIA, Glenn Rose Engine Service; ODESSA, TEXAS, Conley Lott Machinery Co.; ODESSA, TEXAS, Harries Sales & Rental, P. O. Box 1568; LONGVIEW, TEXAS, Conley-Lott-Nichols Machinery Co.

TULSA, OKLAHOMA, SALES, PARTS AND SERVICE—113-117 S. ELWOOD ST.

MURPHY DIESEL



Hercules Powder Company plant at Gibbstown, New Jersey—largest facilities for the production of U.S.P. phenol on the eastern seaboard.

ANOTHER EXAMPLE OF "PARTNERSHIP IN PETROCHEMISTRY"

Many chemical manufacturers who have expanded their activities into petrochemicals, such as Hercules Powder Company, have found it advantageous to have The M. W. Kellogg Company work with them on their process or plant engineering problems.

One reason for this is M. W. Kellogg's 50 years of experience on comparable problems in petroleum refineries, and its more recent background in petrochemical plants. The latter includes ammonia facilities for Shell Chemical Company and Standard Oil Company of Ohio, ethylene plants for Imperial Chemical Industries Ltd., and the phenol-from-cumene project for B. A. Shawinigan Company.

The M. W. Kellogg Company can assume responsibility at any point. In Hercules' case, engineers of both companies collaborated in engineering the process and the mechanical design of this phenol-from-cumene plant. Hercules supplied the process for producing phenol-from-cumene. Kellogg supplied the process used for making the cumene feed. Kellogg erected the process units.

M. W. Kellogg would like to work in partnership with *you*, and invites you to review the facilities it can provide in keeping your initial investment and pay-out time to a minimum.

M W KELLOGG

PETROCHEMICAL PROCESSES AND PLANTS

CHEMICAL PROCESS DIVISION

THE M. W. KELLOGG COMPANY, 225 BROADWAY, NEW YORK 7, N. Y.

The Canadian Kellogg Company, Limited, Toronto • Kellogg International Corporation, London

SUBSIDIARIES OF PULLMAN INCORPORATED

Report on the MICHIGAN TURBO-DOZER:

New dozer features 27 mph speed, power-tilting bowl, rear-wheel steer

The new 2¾ yd. capacity Michigan Turbo-Dozer combines rubber-tired speed and mobility with outstanding traction and power. Its turbocharged diesel engine develops 165 hp, with maximum rimpull of 28,000 lbs.—plenty of power for heavy dozing, push-loading and land clearing. At 27 mph, it runs rings around any dozer on the market!

Power-tilting bowl. A powerful double-acting hydraulic cylinder tilts the bowl back and forth through a 33 degree arc. You can change the angle of the bowl from "dig" to "float" as you travel—work the cutting edge back and forth under stumps and boulders to uproot them. Two 6-inch lift cylinders give you tremendous lifting power and down-pressure—you can raise the cutting edge from 24¼ inches below ground level to 43¾ inches above.

High flotation tires, oscillating axle. Big 18.00-25 low pressure tires (nearly 7-foot tread) give the Turbo-Dozer excellent ground contact in dry, wet or sandy footing. You can cross railroad tracks or travel along the ties or road bed; you can climb curbs and drive safely on any kind of road surface. On uneven terrain, the steering-drive axle oscillates to keep both rear wheels in firm contact with the ground. With 14½ inches of ground clearance underneath, it's practically impossible to get "hung up"

Full traction while turning. The Turbo-Dozer gives you full tractive effort even in a turn. *All four wheels are always driving,* except when you declutch the rear axle for highway travel. Rear-wheel steering eliminates unnecessary tire wear —you don't brake or drag your inside wheels on a turn. If one wheel begins to slip, a locking differential automatically applies power to the wheel with the firmest footing.

Power-shifting, 300% torque multiplication. Clark's exclusive power-shift transmission eliminates the conventional engine clutch and foot pedal—the most notorious cause of excessive maintenance and operator fatigue. With two finger-tip levers on the steering column, the operator can instantly shift between High-Low and Forward-Reverse—even when moving in either direction.

The 3-to-1 Clark torque converter gives you a steady power flow, regardless of speed. As the load gets heavier the torque output automatically increases up to 300% at stall speed—gives you the extra torque to plow through the toughest spots. You can't stall the engine, and there's no clutch to slip.

Prove it for yourself. The new Michigan Turbo-Dozer gives you faster cycles and more yardage in every shift—more dollars of profit every day. Ask your local Michigan distributor to prove it, with an on-the-job demonstration; or write direct for detailed specifications. The Turbo-Dozer is available on the low-cost Michigan Lease Plan: no down payment, pay as it produces!

MICHIGAN is a trade-mark of Clark Equipment Co.

CLARK EQUIPMENT

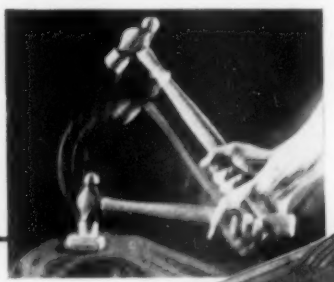
CLARK EQUIPMENT COMPANY
Construction Machinery Division
448 Second Street
Benton Harbor 35, Michigan

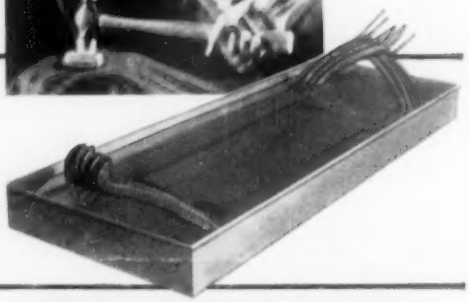
NEW Silco-Flex MOTOR INSULATION

Offers These Amazing Physical Properties

Allis-Chalmers, working with Dow Corning Corporation, has developed *Silco-Flex* motor and generator insulation . . . truly new in concept . . . truly new in effectiveness.

Silco-Flex insulation employs a pure silicone rubber combined with specially developed application techniques to produce an insulation unmatched by any other in use today.





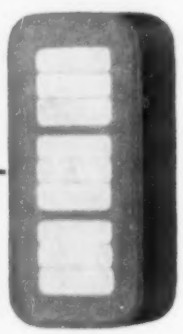
● **Flexibility and Resilience** — *Silco-Flex* insulation remains flexible and resilient indefinitely. It is especially resistant to mechanical abuse and to stresses of overloading, rapid starting and stopping.

● **Moisture Resistance** — Completely sealed, *Silco-Flex* insulated coils are the most moisture-resistant commercial coils ever produced. They are production-tested while submerged in water . . . by far the most complete and searching high potential test used.

● **Abrasion Resistance** — Samples of insulation at right show effects after sandblasting with 90 grit aluminum oxide and 100 psi air for one minute. Nozzle-to-sample distance was six inches, thickness equivalent to 2300-volt insulation. Note difference in abrasion!

Silco-Flex Insulation | Polyester Mica Tape | Asphaltum Mica Tape

● **Homogeneity** — *Silco-Flex* insulation is a void-free dielectric barrier vulcanized into a unified insulating wall. It maintains its homogeneity under extremes of differential expansion and contraction due to thermal cycling.



Other Advantages include exceptionally good thermal stability and chemical inertness. *Silco-Flex* insulation is also a much better heat conductor than ordinary electrical insulating materials. Moreover, enclosures now required to protect windings from moisture and abrasion may be eliminated in many cases.

New *Silco-Flex* insulation is immediately available for all Class H form-wound coils and for Class A and B windings operating under selected service conditions. For complete information, call your Allis-Chalmers representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4774

Silco-Flex is an Allis-Chalmers trademark.

ALLIS-CHALMERS

WHEN YOU'RE LOOKING for exceptional toughness and durability in a finish for gasoline and oil storage tanks, you'll choose Pittsburgh's brilliant White TANKHIDE.

Here's a tough, long-lasting coating that saves you money in two important ways. Its special pigments and vehicles withstand corrosion and weather. Its high heat and light reflection reduce loss of tank contents caused by evaporation.

White TANKHIDE gives you one-coat hiding—can be brushed on when spraying is impractical. Its quick set and firmness of film during drying period prevent collection of dirt and insects, reduce damage from rain, scuffing and abrasion to a minimum. Self-cleaning action maintains its gleaming whiteness throughout its long life.

TANKHIDE is also available in synthetic gray and black as well as in gray and black oil-base finishes that can be used on metal or wood surfaces with equally good results.

Pittsburgh provides a wide variety of high quality finishes for every need in the petroleum industry. Our wide experience in this field often can save you valuable time and money. Write, wire or phone Pittsburgh Plate Glass Company, Industrial Paint Division, 1 Gateway Center, Pittsburgh, Pa.

PPG

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PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

USE AXELSON FROM TOP TO BOTTOM

To hold that production

There is an old saying about no chain being stronger than its weakest link . . . and it's true.

Nowhere, from polished rod to bottom-hole pump, is there a weak link in a well using the right Axelson equipment. You can HOLD that PRODUCTION to the maximum with Axelson.

There is another old adage about experience being the best teacher . . . and it's true.

AXELSON HAS MADE PRODUCTION EQUIPMENT SINCE 1892, and THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY BORN OF TECHNICAL EXPERIENCE.

Tolerate no weak links in your production chain! Confer now with men who understand Axelson teamwork — call your J&L store.

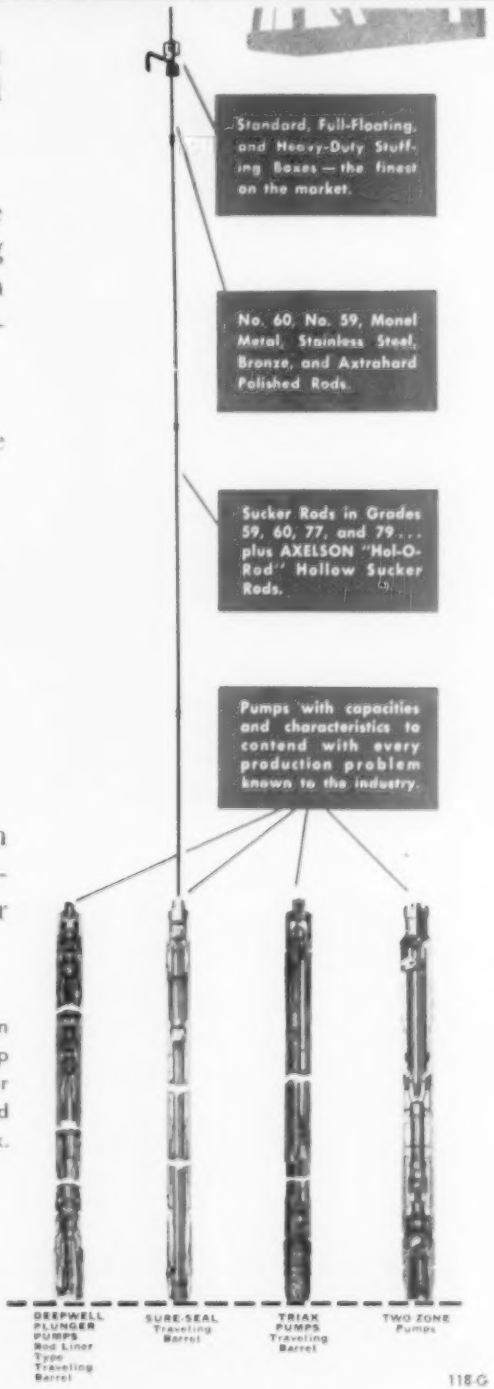
Never junk an Axelson Pump. J&L has a Pump Repair Shop near your production, fully equipped and with parts in stock.

J&L STEEL

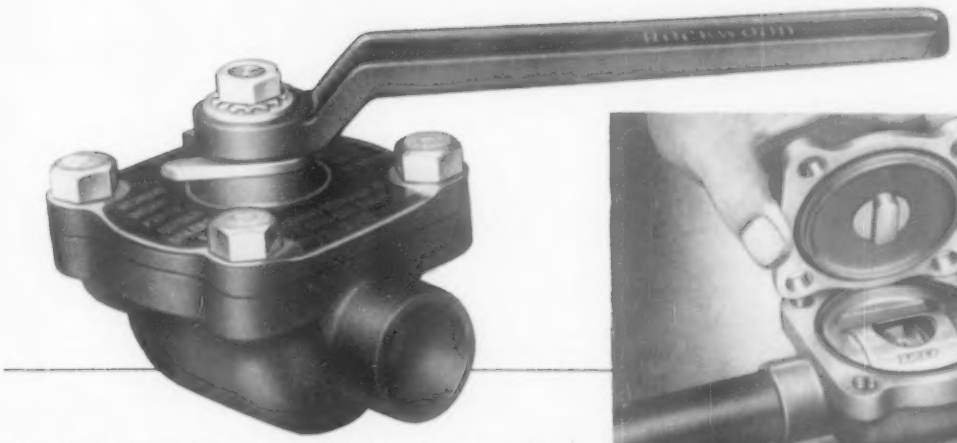
Jones & Laughlin STEEL CORPORATION

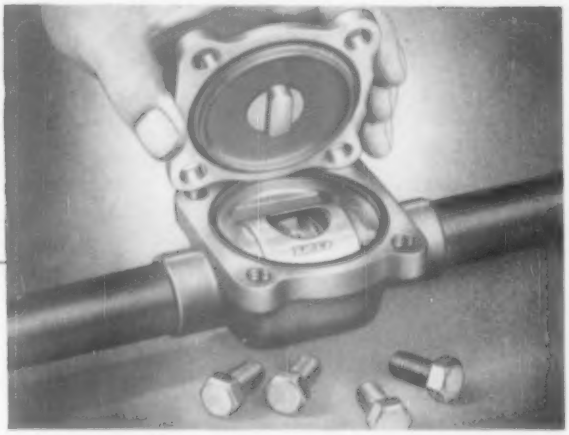
SUPPLY DIVISION — TULSA, OKLAHOMA

Serving The United States and Canada

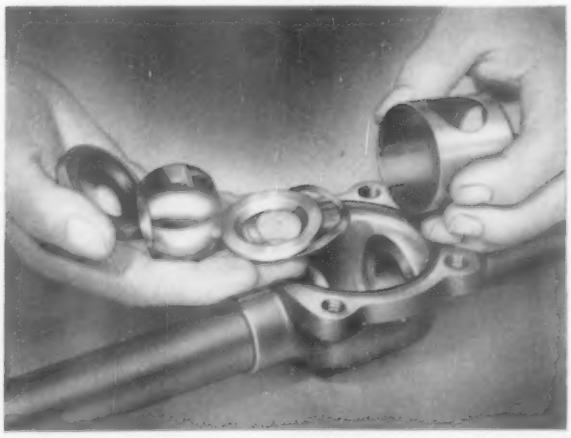

Standard, Full-Floating, and Heavy-Duty Stuffing Boxes — the finest on the market.
No. 60, No. 59, Monel Metal, Stainless Steel, Bronze, and Axtrahard Polished Rods.
Sucker Rods in Grades 59, 60, 77, and 79 . . . plus AXELSON "Hol-O-Rod" Hollow Sucker Rods.
Pumps with capacities and characteristics to contend with every production problem known to the industry.
DEEPWELL PLUNGER PUMPS Rod Liner Type Traveling Barrel
SURE-SEAL Traveling Barrel
TRIAX PUMPS Traveling Barrel
TWO ZONE Pumps

118-G





FAST, LOW-COST CHANGE IN DIRECTION OF FLOW. Removal of the body cap permits reversing the cage assembly to allow change in direction of flow. In addition, this feature lets you change seat material, and clean the valves thoroughly and quickly — *without removing the valve from the line!*



INTERCHANGEABILITY of seat material to meet your operating requirements is another feature of the Rockwood Top Entry Ball Valve. Seat can be furnished in Buna-N, Neoprene, Kel-F, Teflon, and Nylon.

EASY INSTALLATION AND OPERATION is permitted because of the new handle design. This new design allows the handle to be placed in any of *eight positions!*

Now!... New Rockwood Top Entry Ball Valve

. . . A new concept in valves that saves you money and time!

Made of bronze the new Rockwood Top Entry Ball Valve is ideal for handling oxygen and hazardous liquids as well as water, oil and gas. It carries 300 lbs. per square inch on water, oil and gas and 400 lbs. per square inch on LP gas and is available both with sweat ends and screw ends, in sizes ½", ¾" and 1".

Write for complete data on this unique full round pipe size flow.

ROCKWOOD BALL VALVES

FULL, ROUND FLOW

Distributors in all Principal Industrial Areas

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ROCKWOOD SPRINKLER COMPANY
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Please send me complete information on Rockwood Top Entry Ball Valves.

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Company .....

City .....

Zone ..... State .....

The facts behind the Success of the

MARTIN CAGE

When pencil, paper and manufacturing skill were fused in the development of the Martin Cage, one guiding thought was held constantly in mind. *Make a better cage — a cage which would stand the terrific punishment that caused ordinary cages to fail.*

The result, of course, was the Martin Cage. And today, after years of use by economy-minded producers, this one significant fact remains undisputable. *With Martin Cages, ball and seat life is often doubled . . .* So successful has been the Martin Cage that some manufacturers are attempting to follow in its footsteps. Naturally, only Martin can make a Martin Cage.

The secret of Martin Cage's long life is the oil proof rubber ball guides. The resilience, resistance to sand abrasion, non-magnetic character and electrical resistance of this rubber guide successfully combat cage problems. They are manufactured in

Patent No. 2,591,174

open and closed types . . . all diameters and styles. Write for the new John Martin Catalog No. 4, with helpful information on how to select the correct cage for your particular installation.

Martin Cages are available through all supply stores.

JOHN N. MARTIN

Manufacturer

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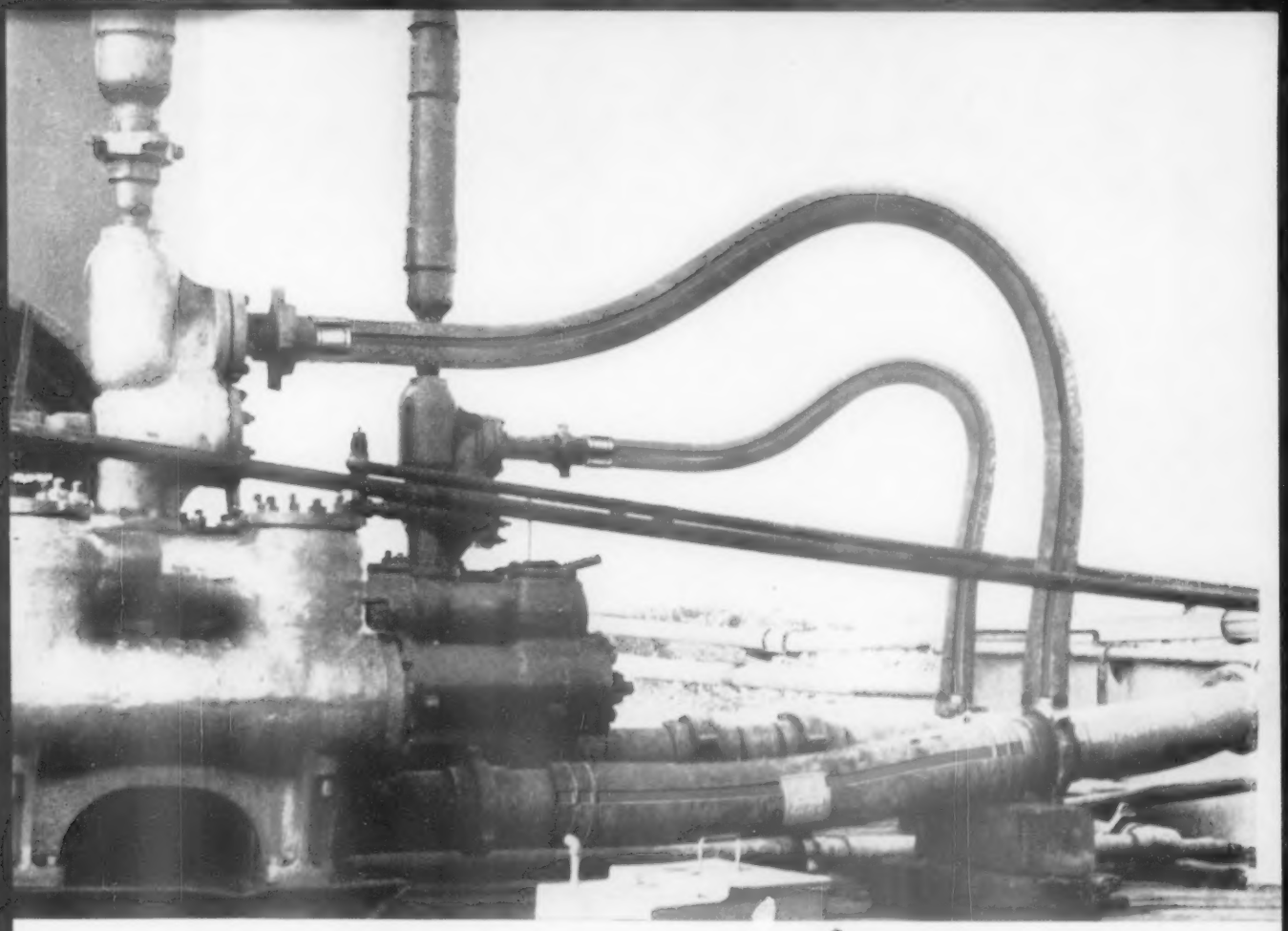

Thermoid Oil Field Products Are Built for Rugged, Continuous Service ...to Cut Your Drilling Costs

Thermoid Flexible Discharge Units provide rugged high pressure connections between mud pump and standpipe . . . eliminate sharp angle fittings, thus reducing turbulence and loss of pressure. Easily installed, they take up misalignment, save rig up and tear down time, resist vibration, cut time lost due to pipe breakage and loosened connections. Full flow pressure seal couplings are built in. Supplied in diameters of 2½", 3" and 3½" . . . standard lengths. Pre-tested to 5000 psi to assure blowout-proof performance.

Thermoid Mud-Flo Suction Hose absorbs pumping vibration and affords maximum flexibility. Thick inner tube and heavy galvanized wire reinforcement imbedded in rubber compound prevents collapse and provides unobstructed flow. Permits changing position of intake without changing connections. Cover withstands abrasion and weathering. Ends are sealed to help keep out moisture.

To keep your costs down, be sure you specify Thermoid Flexible Discharge Units and Mud-Flo Suction Hose.

Mid-Continent Offices and Warehouse, Houston, Texas
California Offices and Warehouse, Los Angeles

Flexible Discharge Unit

Mud-Flo Suction Hose

SEE OUR CATALOG IN THE COMPOSITE CATALOG

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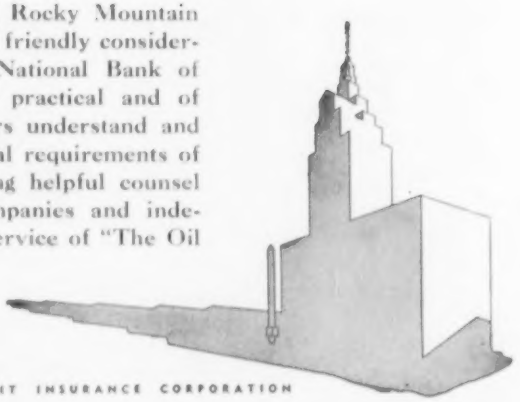

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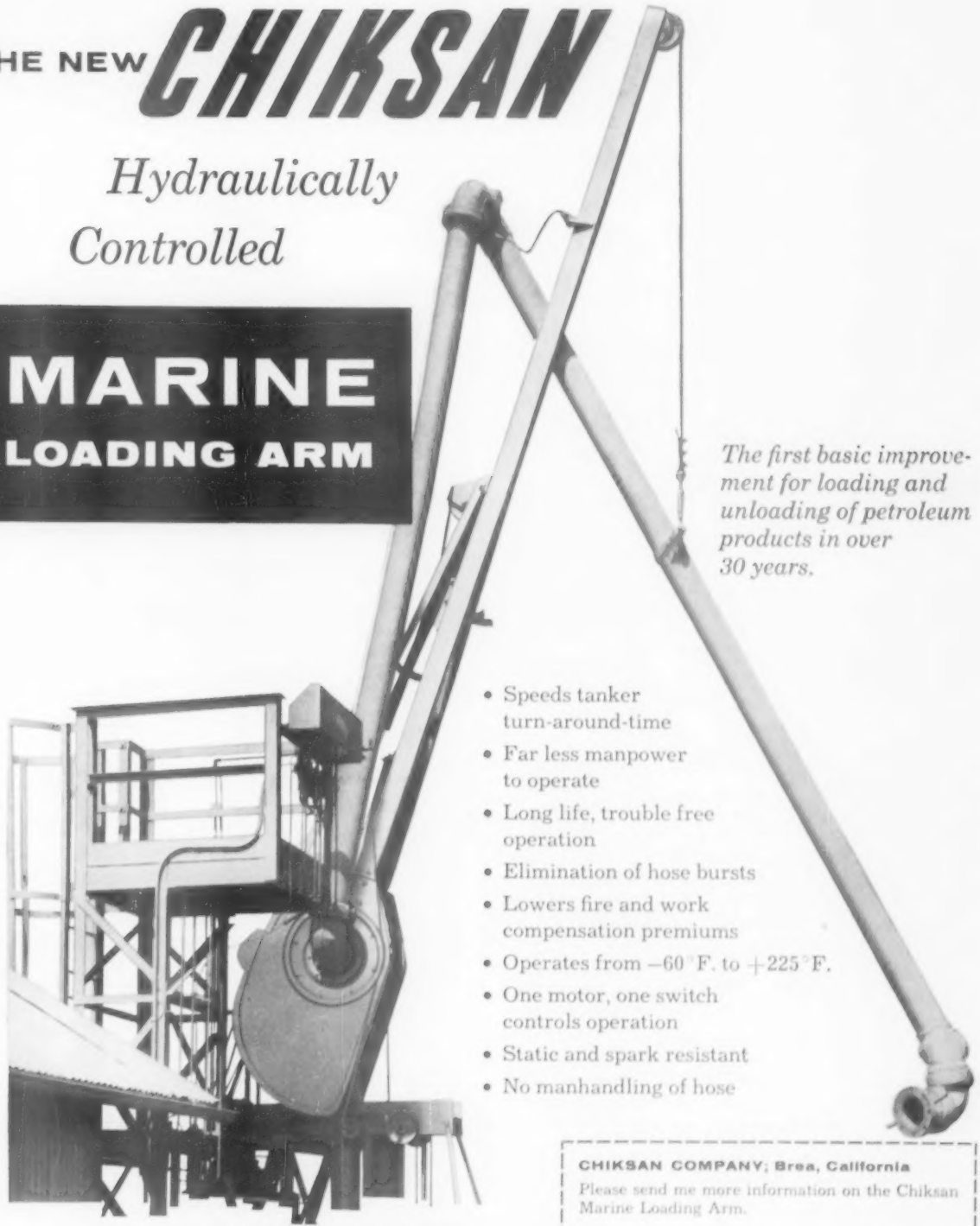

The first basic improvement for loading and unloading of petroleum products in over 30 years.

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The drilling department insists on emulsion mud...

The geological department says "NO!"

This was no friendly argument—it was a red hot rhubarb! To reduce hole deviation and to increase rate of penetration in this wildcat well, the drilling department had run bigger and heavier drill collars in a 10⅝" hole. With 6 to 8 collars (45 ft. long, 9½" diameter stabilized out to 10⅜"), weight on the bit was around 40,000 to 50,000 lbs. (Some operators even carry up to 110,000 lbs. depending upon bit size.)

It is common knowledge that crooked hole problems decrease as collar size increases—less chance for wobble. Dog legs are less severe and more weight on the bit makes hole faster. But small clearances appreciably increase dangers of sticking and should large diameter collars get stuck, man, you're in real trouble! There is no room to fish or wash over.

To take every precaution, the drilling department insisted on an emulsion mud. It slicks up the hole, reduces drill pipe torque, deposits a thin oily mud cake that lessens the hazards of wash outs, minimizes shale problems, usually speeds up drilling rate, and definitely lowers the chances of getting stuck.

The geologists objected to emulsion mud on the grounds that the oil in the mud would interfere with the analysis of cores and cuttings, which is exactly what it used to do before the advent of NO-GLO OIL. Evidences of fluorescence or a stained cut under the black light may come from the mud rather than from the formation—how can you be sure?

They finally agreed on NO-GLO* OIL, since it would satisfy both of their needs. NO-GLO OIL is a colorless, non-fluorescing, specially refined oil which may be added to a clay-water mud in the normal manner, and which *does not fluoresce even under high well temperatures and long aging.*

Shortly after setting surface pipe, they went to a NO-GLO emulsion mud and avoided any serious trouble thereafter. The Division Manager claims that the mud saved setting a $40,000 protective string of casing because the drilling department was unwilling to carry an excessive amount of open hole in this deep test without the benefit of oil in the mud. The geologists encountered no difficulties in accurately interpreting cores and samples. The non-fluorescing mud met all the requirements of a good drilling fluid to everyone's mutual satisfaction.

In many exploratory wells NO-GLO OIL has been successfully used in place of crude oil for spotting to release stuck pipe. Recent extensive tests by a major operator prove that a high gravity refined oil is superior to crude oil for this purpose. Costs of marketing NO-GLO OIL have been substantially reduced; in some areas it is priced but slightly higher than diesel oil. Write for complete information.

*U.S. Patent 2,698,833

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PETROLEUM CHEMICALS DIVISION

NEWS

DU PONT
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October ★ One of a Series of Interest to the Petroleum Industry ★ 1955

A symbol of SERVICE in every community

To the American motorist, the words "petroleum products" and "service" have become almost synonymous.

But the typical American service station stands for more than just automotive service. It stands for *service to the community*, too . . . because the man who operates the station is a *good neighbor*, the kind of man you can count on to take an active part in civic, church and club affairs. And behind the service stations are the thousands of oil company employees and distributors who work together – not just during Oil Progress Week – but 52 weeks a year to make oil progress an important part of the over-all progress of our whole American community.

A PORTRAIT OF PROGRESS

"Speak to the Earth" is a book about oil and oil people

"A new and refreshing book about oil . . . the growth of a great industry in terms of human endeavor and almost super-human achievement!"

We think you'll agree with this statement, too, after you have read "Speak to the Earth," the new book covering the oil industry by Max Miller, well-known author of "I Cover the Waterfront" and 22 other books. The book explains exploration, drilling, production, transportation, refining and marketing, in an easy-going, realistic, yet entertaining style.

Max Miller was retained by the Du Pont Company to write the story. And to help promote a better understanding of the oil industry, the book is now being made available to the public at book stores by its publisher, Appleton-Century-Crofts, Inc.

New survey studies dealer knowledge of product quality and sales assets

That old familiar phrase, "know your product," is still a cardinal rule of good selling. And since your service station dealers are your main link with the motoring public, their knowledge of your product features can have a mighty important bearing on your own sales volume.

But how much does the average service station dealer really know about the products he sells? To help you answer this question accurately and statistically, Report No. 2 of the new Du Pont survey on "The Service Station Operator" is now ready for distribution to oil company marketing executives. Here is a quick preview of the type of information it contains.

HOW MUCH do dealers know about the additives in the gasolines they sell? This new Du Pont survey can help you answer this question.

The report discusses the dealer's knowledge of the products he sells, including his knowledge of additives and their functions, his opinion of what his greatest gasoline sales assets are, and his knowledge of gasoline pricing.

"What's the difference?"

Our researchers asked this question in regard to the difference between "regular" and "premium" grades. Two-thirds of the dealers mentioned *octane number* as the chief difference. And many of them answered in terms of customer benefits – such as power and pick-up, antiknock, starting and warm-up qualities, and mileage.

But what about brand differences? The dealers' answers to this question may be quite significant—although not as encouraging. Nearly two-thirds of the dealers said they felt the premium gasolines sold by the major oil companies were pretty much the same . . . and more than two-thirds felt that the regular gasolines were pretty much the same, too. But of those who felt there was a difference, two-thirds said their own brand was superior.

The survey also documents the dealers' knowledge of motor oil quality. In this respect it is interesting to note that,

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OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED *Dealer Survey*

when discussing the difference between grades of oil, more than half of the dealers mentioned the *detergency* of the oil.

Other factors

The dealers' knowledge of the additive content of the petroleum products they sell was also probed . . . as was their knowledge of prices in their local marketing area. And the survey included questions about tires, batteries and such services as chassis lubrication and automatic transmission service.

Their own sales assets

To the question, "What do you consider your greatest sales asset?" the dealers returned a wide variety of answers. You'll probably find this page the most interesting and significant in the whole report. It includes the dealers' own relative ratings of such factors as brand, station location and hours, advertising, service, friendship, and many more.

Regional breakdowns

Although the dealer survey is nationwide in scope, it is broken down regionally according to the four main marketing areas of the country. Because of this, it will be extremely helpful to regional as well as national marketers.

Sponsored by Du Pont, the survey was conducted by National Analysts, Inc., on a completely impartial basis. The results are being published in a series of five reports. The first covers station hours and rush periods, gallonage sold, customer credit, and the use of customer mailing lists.

Now available

Both Reports No. 1 and 2 are now available to marketing executives through any of our regional offices listed below. The remaining three reports will be issued periodically during the next six months.

Continuing market research

This survey on "The Service Station Operator" is part of the continuing market research work of the Du Pont Petroleum Chemicals Division. Another part of this program is the Du Pont survey of service station customer buying habits.

CENTRAL REGION LAB MANAGER

ARTHUR R. KERNEN joined the Du Pont Company in 1947 after receiving his M.S. degree in chemistry at the University of Delaware.

His first assignment was as a research chemist at the Du Pont Petroleum Laboratory. Following this he did both development and sales-service work on gasoline additives and stability problems.

In September, 1953 he was appointed manager of the Petroleum Chemicals Division's Central Region laboratory in Chicago. He is in charge of customer service in product testing and analysis and additives treating recommendations.

Before beginning his graduate work, he received a B.S. degree at the University of Notre Dame. He also attended Xavier University in Cincinnati, Ohio.

ARTHUR R. KERNEN

Mr. Kernen is a member of the Society of Automotive Engineers and the American Chemical Society.

Du Pont's Fuel-Injection Test Car Hits the Road

In view of the possibility that many automobiles will soon be equipped with fuel-injection engines, a special fuel-injection system was added to a Lincoln car at the Du Pont Petroleum Laboratory in 1954. The purpose of this car is to study the possible advantages of fuel injection to the refining industry.

From testing a variety of gasoline blends in the fuel-injection engine, it has been found that fuel-injection permits greater flexibility in blending fuels. Higher vapor pressures can be used, and it is possible that increases in end point might be practical. These wider tolerances could mean a substantial benefit to refiners and the motoring public.

The car has a standard Lincoln V-8 engine to which has been added an American Bosch fuel-injection system and special instrumentation. The system gives freedom from carburetor icing, relief from vapor lock troubles, improved power, and permits styling changes since the hood lines can be lowered with the less bulky fuel-injection pump.

For studying the performance of different gasolines in the fuel-injection engine, the Petroleum Laboratory has tested the car on the laboratory's chassis dynamometer. The Petroleum Chemicals Division has also made plans for the car to make a demonstration tour.

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The compass stops—the steel ball steadies—the light flashes and a picture is made. A series of pictures and the Schlumberger directional survey is completed. The operation of the Schlumberger Photoclinometer is simple. It is completely controlled from the surface and gives you, quickly and accurately, the inclination and direction of the bore hole at multiple levels. Use the Schlumberger Photoclinometer regularly. It is the most rapid and economical method of obtaining a directional survey of your well.

SCHLUMBERGER

Well Surveying Corporation

THE EYES OF THE OIL INDUSTRY

HOW TO GET THE BEST RESULTS FROM ANY TRAPPING JOB...

DRAINING CONDENSATE FROM STEAM

How to correctly size, install and maintain steam traps for any pressure, any temperature, any load... Armstrong inverted bucket trap design principles and advantages... sizes, list prices, physical data, capacities... data on variable loads, warming-up loads, submerged coil heat transfer, steam main and riser drainage... trapping of unit heaters... power plant trapping, and many other subjects. ASK FOR 44-PAGE CATALOG J, The Armstrong Steam Trap Book.

DRAINING LIQUIDS FROM AIR AND GAS

How to select and install ball float traps for draining light liquids or water from drip points, aftercoolers, separators, etc., in compressed gas and air systems... liquid level control hookups... high pressure trapping to 1000 psig... trap materials for corrosive service... capacities, physical data, list prices, single lever, compound lever and "snap-action" traps. ASK FOR BULLETIN 289.

VENTING AIR AND GAS FROM LIQUIDS

Selection and installation of ball float traps for venting air and gas from water and light liquids under pressure... contains useful table on air discharge through various size orifices at pressures from 1 to 1000 lbs.... when and how to back vent traps... floats and mechanisms for other manufacturer's devices... sizes, list prices, materials, dimensional data for Armstrong Ball Float AR Traps. ASK FOR BULLETIN 450.

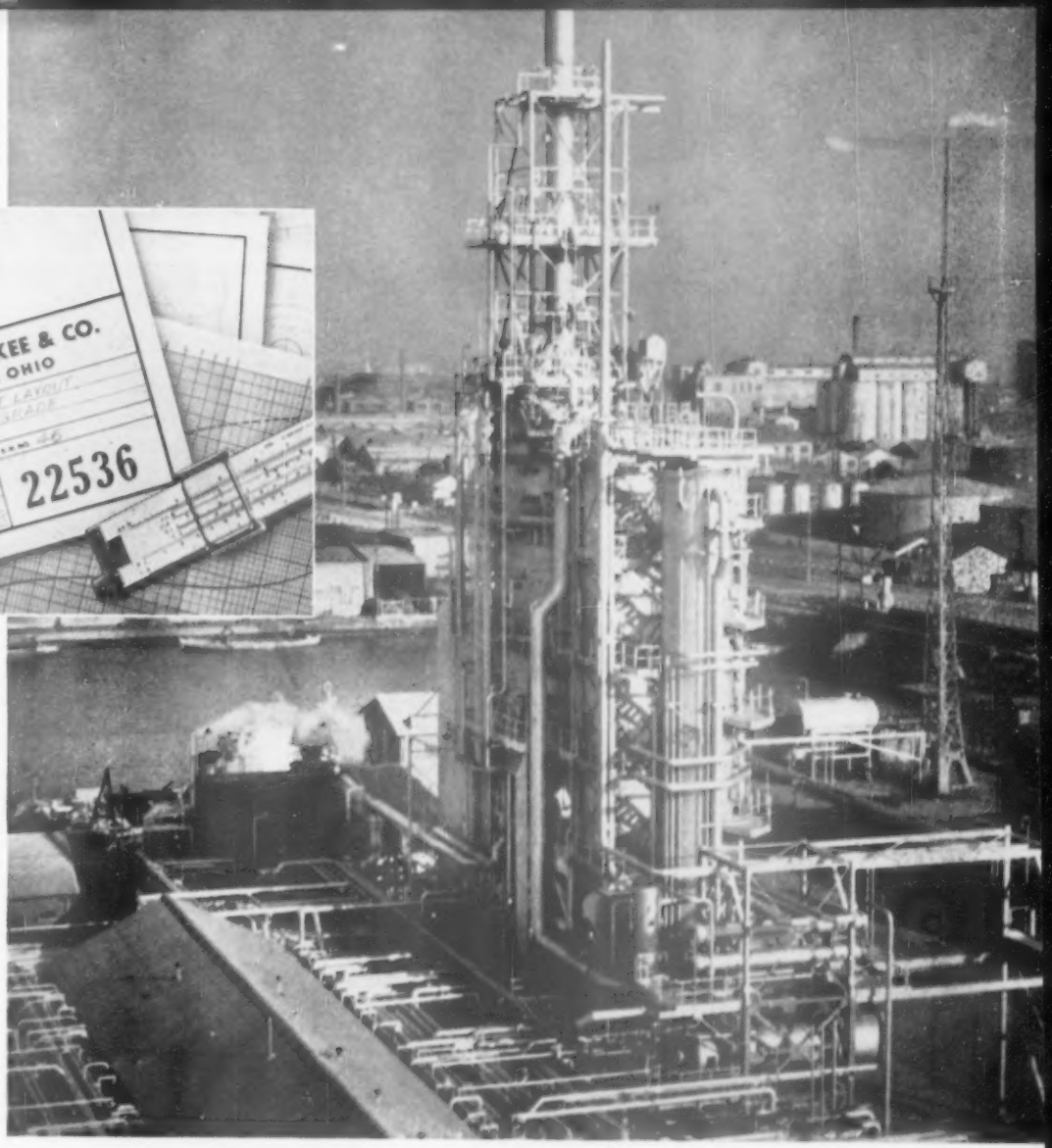
DRAINING WATER FROM LIGHT LIQUIDS

Dual gravity trap selection and installation explained and diagramed... for draining gasoline separators, dehydrator tanks, debutanizers, etc.... orifice capacity data, dimensions, materials, list prices for Armstrong Ball Float D/G Traps. ASK FOR BULLETIN 2091.

Free on request without obligation—call your local Armstrong Representative, or write Armstrong Machine Works, 868 Maple Street, Three Rivers, Michigan

ARMSTRONG

INVERTED BUCKET and BALL FLOAT TRAPS FOR THE PETROLEUM INDUSTRY



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A half-century of experience has shown us (and our hundreds of customers) the value of thorough, painstaking engineering of projects like yours. We know that meticulous care and accurate thinking-through of every detail of design and engineering pays off for you in dollars and cents.

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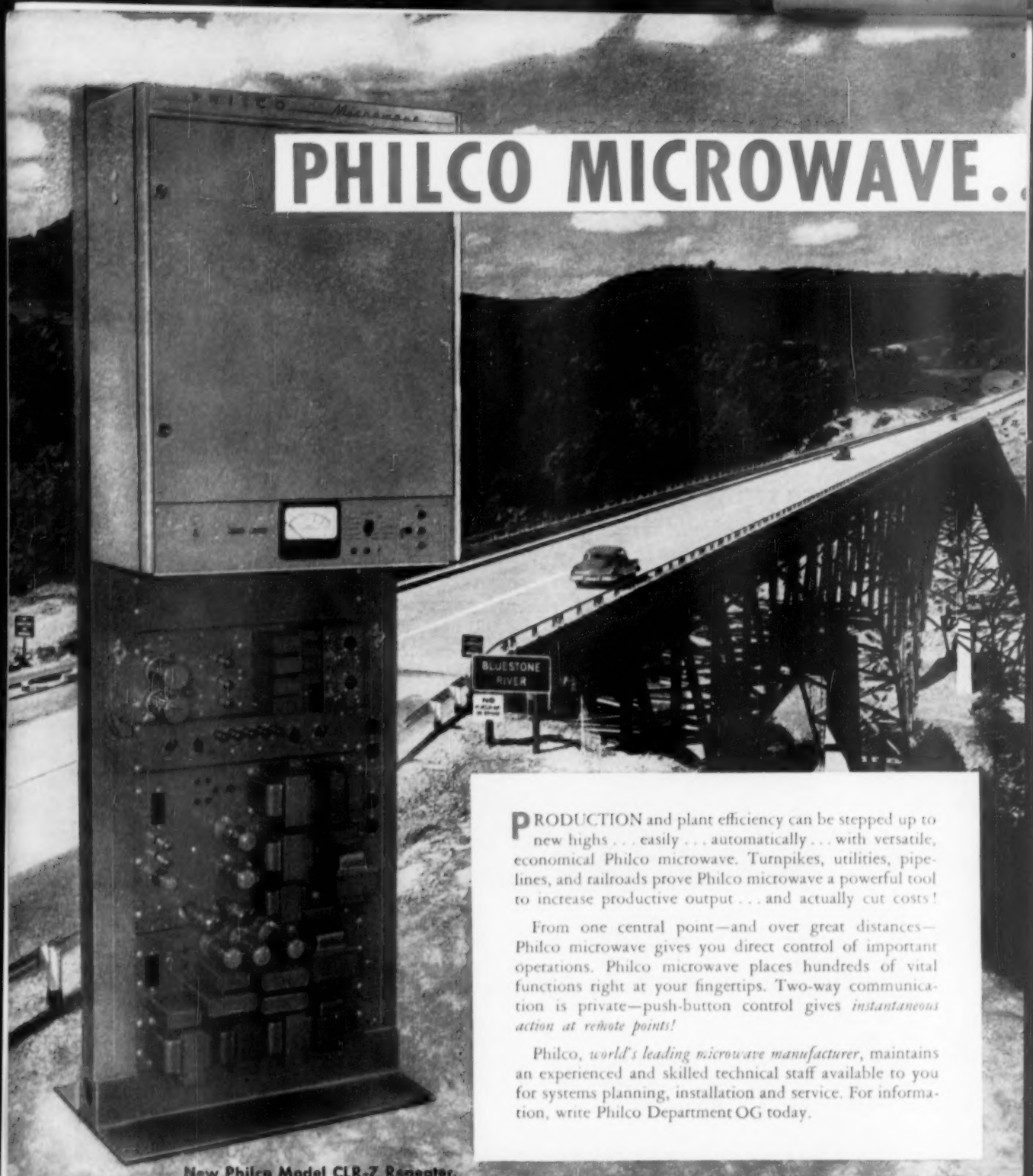
PHILCO MICROWAVE..



New Philco Model CLR-7 Repeater.

PRODUCTION and plant efficiency can be stepped up to new highs . . . easily . . . automatically . . . with versatile, economical Philco microwave. Turnpikes, utilities, pipelines, and railroads prove Philco microwave a powerful tool to increase productive output . . . and actually cut costs!

From one central point—and over great distances—Philco microwave gives you direct control of important operations. Philco microwave places hundreds of vital functions right at your fingertips. Two-way communication is private—push-button control gives *instantaneous action at remote points!*

Philco, *world's leading microwave manufacturer*, maintains an experienced and skilled technical staff available to you for systems planning, installation and service. For information, write Philco Department OG today.

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by Centralizing Plant Control!

TURNPIKES use Philco microwave for traffic control. Over rough terrain, fully automatic Philco microwave systems provide a reliable, low-cost means of communication to meet emergencies, keep highways clear of possible blocks . . . maintain contact with radio-equipped cars and trucks . . . 'round the clock.

Photo courtesy West Virginia Turnpike

PIPELINES use Philco microwave for automatic operation. At this control center, pressures and flow rates of oil, operation of pumps, compressors and telegraphic printers, throughout this 1000-mile pipeline, are monitored and automatically controlled. Duplex voice communication is provided from one location to another.

Photo courtesy Platte Pipe Line

RAILROADS prove Philco microwave dependable. Philco microwave has proved to be a reliable and dependable means of communication, even during floods and storms when vulnerable wire lines have failed. Voice communication, telegraph and teletype are transmitted instantly to remote stations along the route.

Photo courtesy Santa Fe Railroad

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Get all the information today. Call the J&L distributor nearest you. He'll tell you all about the product and give you complete, efficient service.

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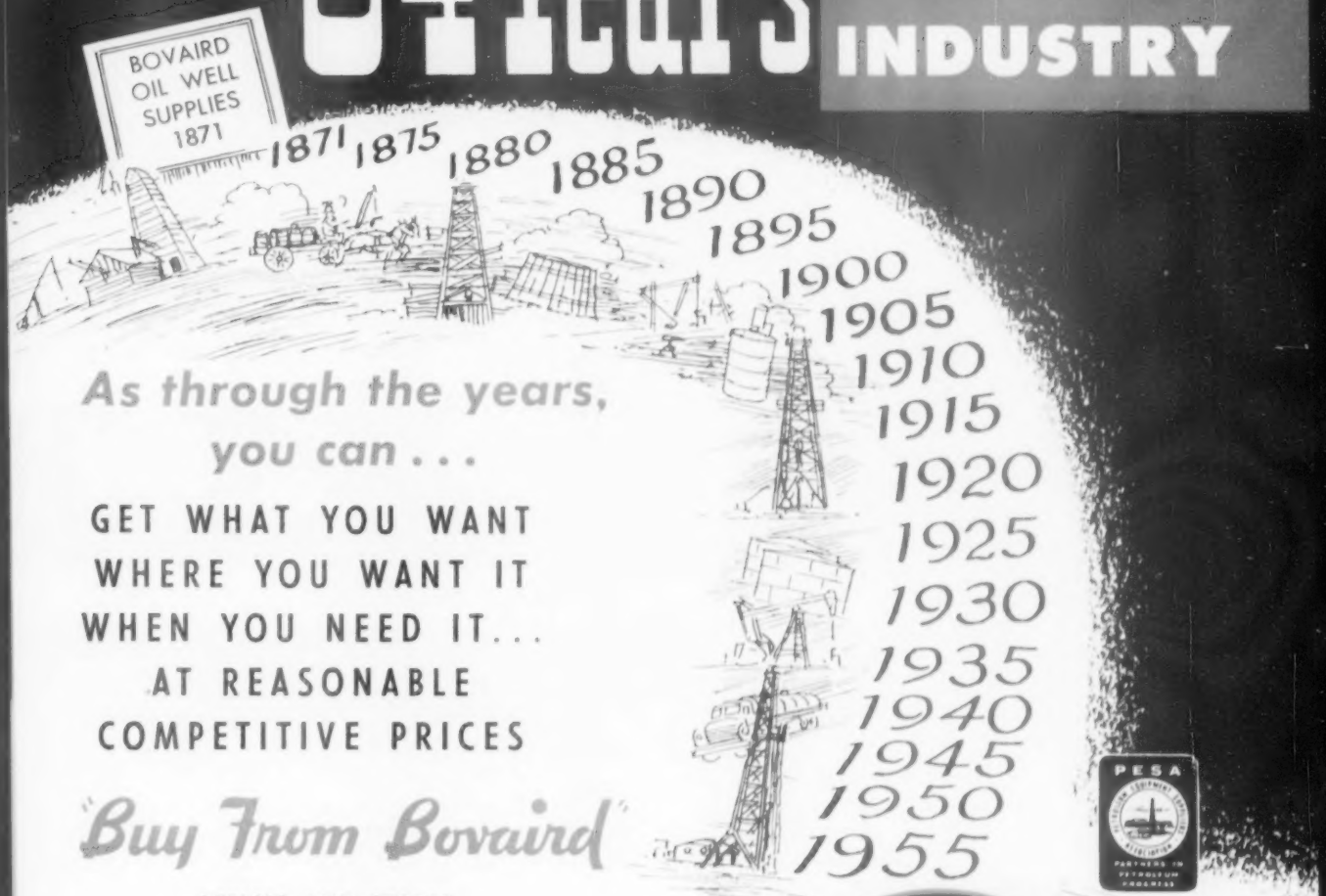

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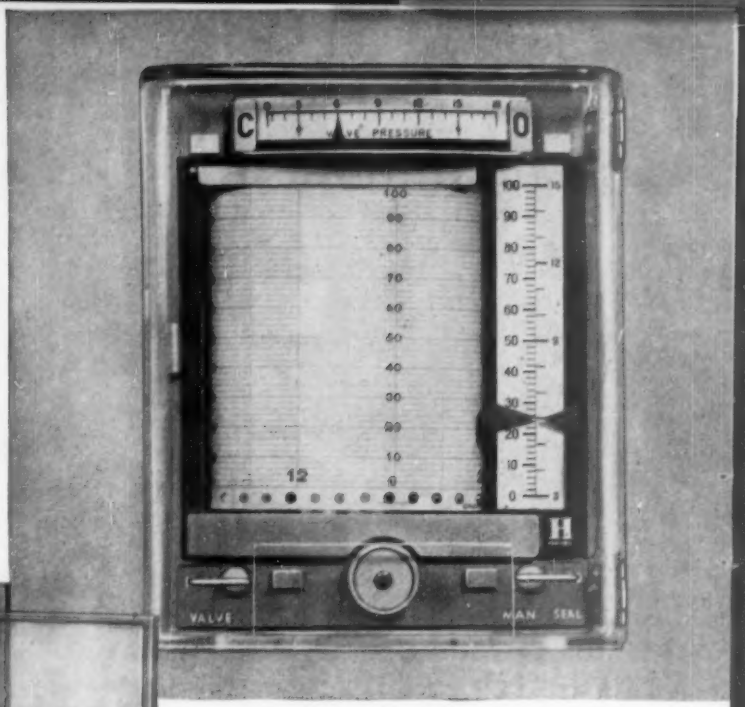

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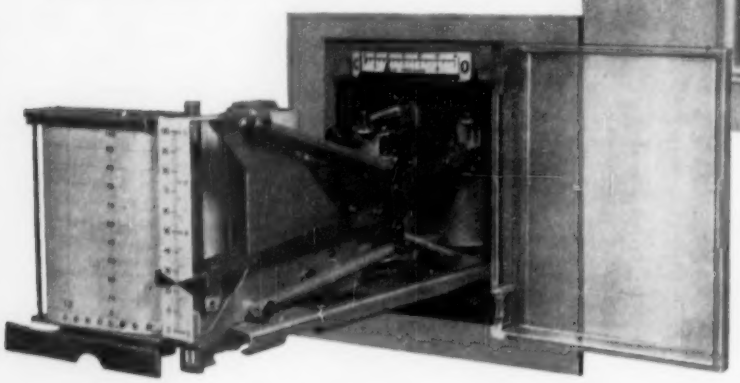
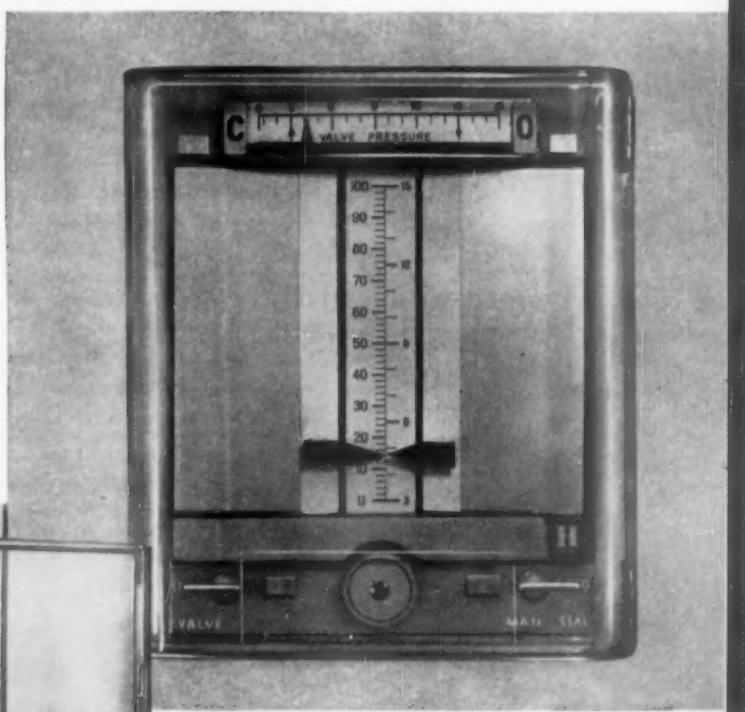
takes panel cut-out only 5-1/32" high by 4-9/16" wide. Chassis slides out of case as a complete unit . . . can be shipped separately to prevent damage and collection of dirt or dust awaiting start-up. In partially withdrawn position, the internal mechanism is accessible for adjustments. Uses identical case as indicator. Bottom-of-case location of control knobs permits instrument to be mounted higher on the panel.

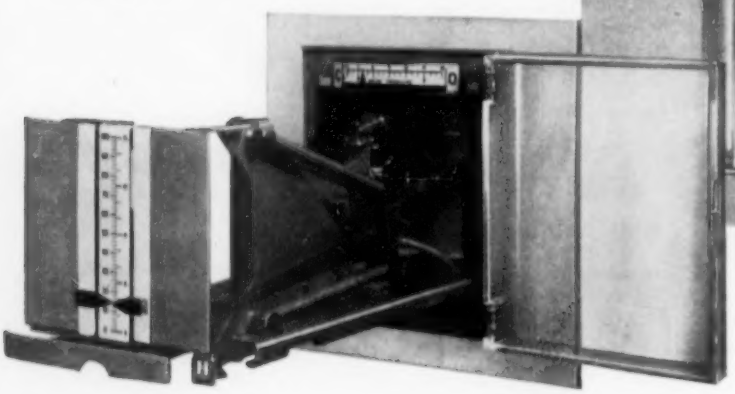


today's



NEW TEL-O-SET INDICATOR

takes same panel cut-out as recorder . . . uses many of the same parts. Less spare parts inventory is required. Note the rugged construction, easily accessible calibration adjustments. Vertical scale makes it easy to compare set point and measured value. Recorder and indicator chassis are completely interchangeable.



● **REFERENCE DATA:** Write for new Bulletin No. 7202.

In performance . . .

precision . . .

serviceability . . .

Tel-O-Set instruments

give you extra values

Whenever you're planning graphic process control, plan to take advantage of the extra values built into the latest *Tel-O-Set* miniature instruments. These advanced indicators, recorders and controllers simplify installation, service and replacement problems . . . and give you the top in accurate, flexible performance for controlling temperature, flow, pressure and liquid level.

Installation is easier. Case, chassis and controller are separate units. The case can be shipped separately to the point of installation and fully piped and tested . . . for the air to valve gage, regulator and switch assembly remain with the case. These components are readily removed without need for breaking conduit or electrical connections. Panel shipment is simplified, with chassis and controller going directly to the job.

Service is easier. All major parts of the indicator and recorder are identical and interchangeable. Unitized construction of sub-assemblies permits interchangeability of sections of major assemblies. The chassis can be partially or fully withdrawn and remain completely operative. It can be disconnected without losing manual control. Controllers have single-lever, quick-disconnect switch . . . use simple, gasketed, flat, mating surfaces.

Operation is easier. An integral switch provides external reset feedback, air on automatic position or air on manual position of bypass relay . . . permitting use with any force-balance controller of past or present design. Opposing pointers tell the measured value and set point on prominently marked vertical scales. Control knob and transfer switch are conveniently located at the bottom of the case, where the operator can manipulate them without having his hand obscure vision of the pointers and scale.

Precision is high . . . ample for even the most exacting process requirements, with true linear calibration.

For a discussion of applications to your own processes, call your local Honeywell sales engineer . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

a tight fit is an advantage here

here's how B&W SEAMLESS ALLOY WELDING FITTINGS SAVE SPACE IN A PIPING INSTALLATION

Design for Compactness with B&W Seamless Welding Fittings

Consider these important advantages in making extra plant space available. Note how the elimination of flanges and bolts can simplify the entire structure.

True circularity and uniform wall thickness throughout enables special odd angle cuts to be made when necessary, and still be aligned with the pipe.

Compact piping systems are easily managed through the use of welding fittings. They permit close-nesting in corners, or against walls and ceilings.

The right selection of many possible shapes offers limitless possibilities of piping design to fit almost any space available.

Welding fittings permit simplified design of a piping system. They present a compact, streamlined layout . . . the absence of bolts and flanges allow piping lines to be close-nested, or to hug walls, ceilings or plant equipment.

The joint between fitting and pipe, in welded construction, is virtually flush, with the weld metal forming a solid, tough structure whose strength approaches that of the pipe itself.

B&W SEAMLESS WELDING FITTINGS

GRADES: Carbon, Alloy and Stainless Steels.

TYPES: Elbows, Tees, Caps, Saddles, Laterals, Nipples, Returns, Flanges, Stub Ends, Reducers, Crosses, Bull Plugs.

SIZES: Complete range of sizes and schedules.

IT PAYS TO LOOK AT THE ADVANTAGES OF USING B&W SEAMLESS WELDING FITTINGS

Welded Construction Assures Minimum Pressure Loss—True circularity and radii, uniform wall thickness, and smooth inner walls reduce friction, turbulence and subsequent erosion, adding to piping system life.

Whole Sections Can Be Shop-Fabricated—For fast installation, or where working space is limited, entire sections can be shop-fabricated and installed by any qualified welder in a few minutes.

Welded Construction is Easily insulated — Insulation is simplified by the absence of complex flanged assemblies. Because joints are leakproof, insulation is permanent and maintenance free.

Welded Construction is Permanent — Maintenance costs are kept at a minimum because piping is permanent and leakproof. The strength of the weld approaches that of the pipe itself.

Welded Construction is Simple to Install—Dimensional accuracy of angles, radii, and bevels, assure quick and easy joining. Any qualified welder can do the job efficiently and economically.

Welded Construction is Lightweight—Strength with lightweight permits easy handling in installation. Unwieldy sections can be joined on the ground, and then quickly fastened into position.

THE *NATURAL* SOURCE FOR ALLOY FITTINGS

B&W TUBULAR PRODUCTS DIVISION

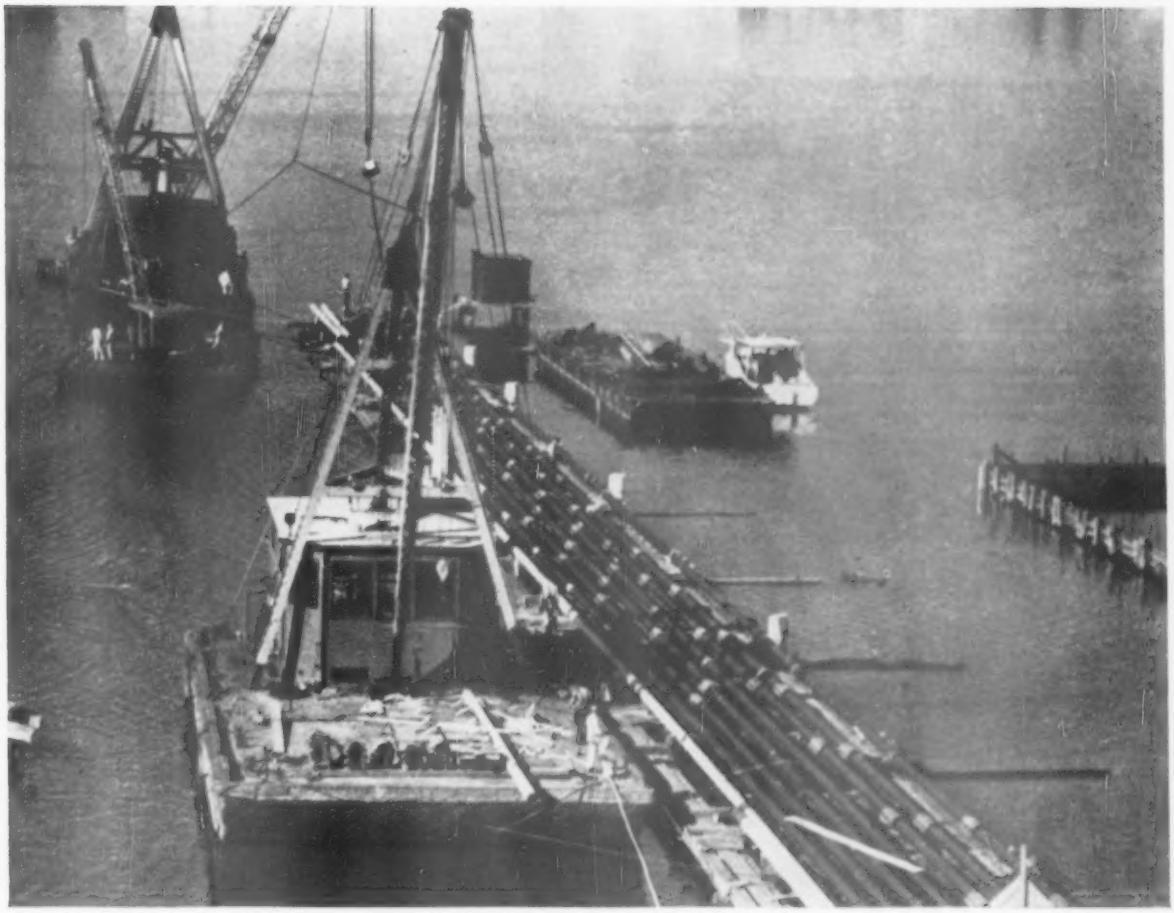
THE BABCOCK & WILCOX COMPANY

Tubular Products Division • Fittings Department

3839 W. BURNHAM STREET • MILWAUKEE 46, WIS.

FA-5907

District Sales Offices: BEAVER FALLS, PA. • BOSTON 16, MASS. • CHICAGO 3, ILL. • CINCINNATI 6, OHIO • CLEVELAND 14, OHIO • DETROIT 26, MICH. • HOUSTON 19, TEX. LOS ANGELES 17, CAL. • MILWAUKEE 46, WIS. • NEW YORK 16, N. Y. • PHILADELPHIA 2, PA. • ST. LOUIS 8, MO. • SAN FRANCISCO 3, CAL. • SYRACUSE 2, N. Y. • TULSA 3, OKLA.



"NO-OX-ID BEATS A BRINY PROBLEM"

There is no environment in nature more corrosive to iron and steel than sea water. That's why proper protection of undersea pipeline installations is so vitally important. The line must be sufficiently shielded to withstand a continuous bath of brine... not for weeks or months, but for many years.

Dearborn's "B-7" specification materials give underwater carrier lines complete protection—the kind of protection they need for long-term, uninterrupted service.

This 10" pipe was mill coated with NO-OX-ID 6X, No. 7 NO-OX-IDized Reinforced Asbestos Wrapper, NO-OX-ID Service Coat No. 15 and kraft paper. The joints were then protected with NO-OX-ID 6X and NO-OX-IDized Wrapper, followed by an application of Rock Shield, banded over the entire surface.

Brine-resisting "B-7" is only one of many NO-OX-ID coating and wrapper combinations. Others provide protection against abrasion, soil stress and moisture absorption...and insulate against electrolytic action. Whatever your pipeline protection problem—there is a NO-OX-ID Coating Combination to do the job...under ground or under water.

Whether applied by hand...by Traveliner...or at the mill, NO-OX-ID Combinations are your best assurance of lasting pipeline protection. On your next job, take advantage of Dearborn's experience —ask for recommendations.

Dearborn NO-OX-ID®

For Long-Term Pipeline Protection

DEARBORN CHEMICAL COMPANY
Merchandise Mart Plaza, Dept. OG, Chicago 54, Ill.

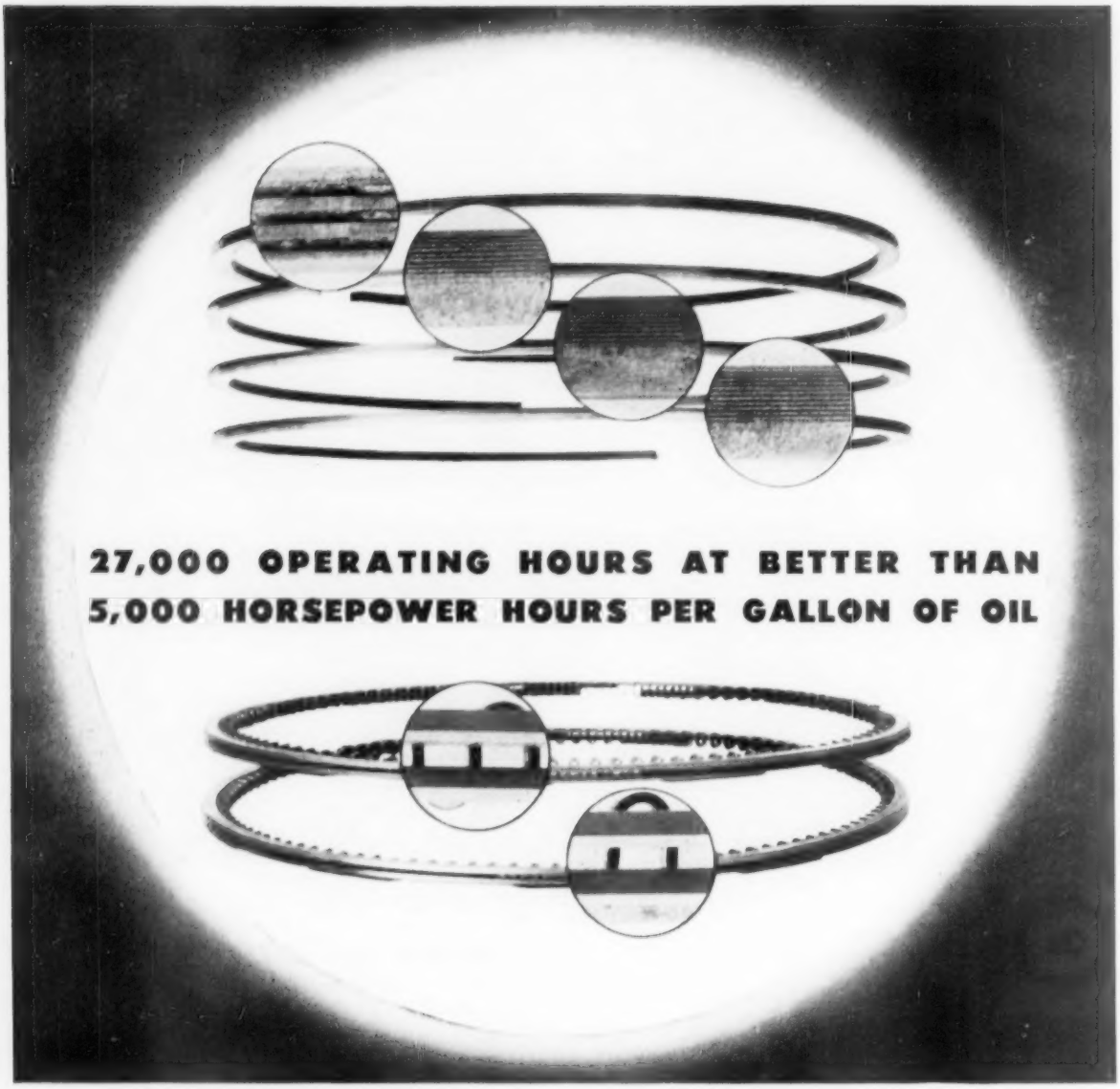
☐ Please send me complete information about NO-OX-ID
☐ Have a Dearborn Pipeline Engineer call

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....



27,000 OPERATING HOURS AT BETTER THAN 5,000 HORSEPOWER HOURS PER GALLON OF OIL

ENGINEERED RING SETS IS A PEDRICK FIRST

In 1921, the first complete set of rings in a single package, engineered for a particular internal-combustion engine, was introduced *by Pedrick*. You get 35 years of experience and know-how, therefore, in the complete sets we engineer for diesel and gas engines.

That's part of the reason Pedrick Engineered Sets give the kind of performance revealed by the un-retouched photo above. These rings are from a Pedrick E3902 Set taken out of a Cooper-Bessemer GMV engine after 27,109 hours of operation. Oil consumption averaged better than 5,000 hp. hrs. per gal. Wear in the cylinders was almost insignificant—averaging only .00725 in. at the top and .0035 in. at the bottom. Ring tension remains at practically original production level. Each ring shows face-wear only about halfway up, so rings still are practically as good as *new!*

For *your* engine's own good, use Pedrick Engineered Sets with the latest ring designs in proper combination, illustrated installation instructions, a single package per cylinder. You'll also enjoy the benefits of simplicity in ordering and stocking. The same engineering know-how which goes into Pedrick Engineered Sets is available to help you with special problems. Write, wire or phone: WILKENING MANUFACTURING CO., Philadelphia 42, Pa. SAratoga 9-3770. In Canada: Toronto 2.

Pedrick HEAT-SHAPED **PISTON RINGS**

PEDRICK PRECISIONEERING KEEPS PEDRICK FIRST

A pencil pokes through this corroded metal! Why chance trouble like this? Cathodic Protection and ANACONDA Type CP Cable effectively check corrosion of buried metals.

For longer cable life in cathodic protection —Anaconda Type CP Cable

Moisture, soil acids and alkalies, and —most important—oil are tough on present cables used in Cathodic Protection.

Anaconda's new Type CP Cable is specially designed—with double covering of polyethylene and Densheath* (PVC) — to resist these enemies of cable life. This means less frequent replacement . . . major savings in both labor and material costs.

*Reg. U. S. Pat. Off.

Polyethylene and Densheath used in ANACONDA CP Cable are inherently resistant to oil. And they have high resistance to electro-endosmosis, as well as to moisture and most acids, alkalies and chemicals found in corrosive soil areas. Rugged Densheath jacket withstands toughest abrasion, and weathering.

This cable is light . . . easy to install, splice and terminate. Ask the Man from Anaconda—or your Distributor—for full information. Also—write for Bulletin DM 5450: "Anaconda Cathodic Protection Cable." Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

ANACONDA®
COPPER AND ALUMINUM
WIRE AND CABLE

Where Anaconda Type CP Cable and Cathodic Protection Cut Corrosion Costs

Tank farms

Booster stations

Pipe lines

Oil Refineries

Wise man with a well . . .

Oil's of little use where nature put it. Somebody's got to get it out of there. Somebody's got to keep the pumps pumping, and the engines humming, and the wells producing. Somebody's got to know how much oil's coming up, and if it's enough . . . or too much . . . or too little. They call this man a pumper. He's a wise man with a well. He can tell by the sounds coming up the pipe if all is all right 2 and 3 miles down. And if it isn't, he knows what to do. He's a big, important reason why Texaco products keep flowing steadily to meet a constant, 48-state demand.

The Texas Company

TEXACO

SMOOTH SERVICING
ON DEEP WELLS
MOGUL *Torcair* 42 Single or Double Drum Winch

CAPACITY: SERVICING WELLS TO 10,000 FEET With 2 ½-Inch Tubing, Without Hydromatic Brake — **SERVICING WELLS TO 16,000 FEET** With 2 ½-Inch Tubing, With 15" Double Rotor Hydromatic Brake . . . **AND NOTE THESE:** • FULL AIR CONTROLS • FULL OIL BATH CHAIN DRIVES • LOWER DRUM BRAKE RINGS 42" x 8 ½" • WILSON QUALITY THROUGHOUT • TORQUE CONVERTER APPLICATION —

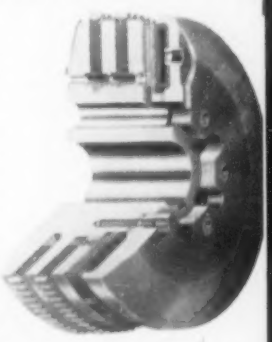
Either a Torcon Torque Converter, Twin Disc or GM Converter can be used with any single engine Torcair Rig or Winch.

Complete Portability! Under 8 Feet in width!

Be Modern - Buy Wilson

ALL DRIVES EQUIPPED WITH

WICHITA AIR-TUBE DISC CLUTCHES



This type of clutch combines all the advantages inherent in air operation, such as convenient remote control, small manual pressure required for full torque, smooth starting and controlled torque. In addition, it gives freedom from self-engagement or reduced capacity, due to centrifugal force, and has much greater torque capacity than radial type air clutches. No packing to leak or let water or oil into the clutch friction surfaces. All air connections are on the outside and easily accessible. This without a doubt the finest clutch yet developed for this type service, providing great capacity in minimum space, no adjustments, practically impossible to burn up. **SMOOTHEST ENGAGEMENT OF ANY AIR CLUTCH!**

HYDROTARDER BRAKE APPLICATION

HYDROTARDER: The Mogul unit can be equipped with the 15" Double Rotor Type Hydromatic Brake driven by a chain drive from the countershaft. This brake can be used with either upper or lower drum, and when used on main drum with five lines strung up will absorb a total of 1300 H.P. when dropping the stands at the rate of 60 feet in 12 seconds. This is the equivalent of 16,000 feet of 2 ½" tubing. The brake is so arranged that it will absorb very little power when taking up the empty blocks and jaw clutch does not need to be disengaged to take up the empty blocks when the trip is completed.

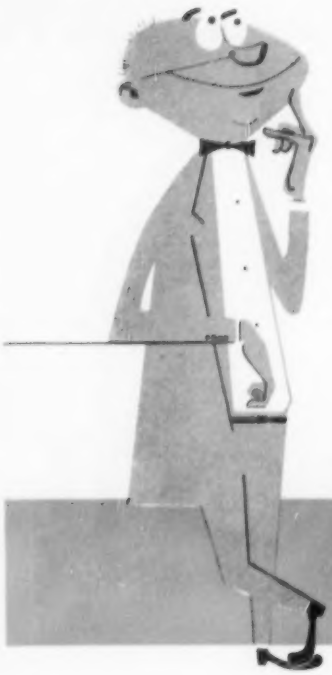
Wilson

The FIRST NAME in OIL FIELD WINCHES

WILSON MANUFACTURING CO., Inc.

The HOME of RED IRON • Wichita Falls, Texas

BEARING TROUBLES?



NO SIR! Not with new Reliance Motors and METERMATIC .... the

Automatic Grease Monkey

I found out how to put an end to burned out bearings from the Reliance Metermatic Bulletin, A-2406. Why don't you write for one? A-1109

RELIANCE ELECTRIC AND ENGINEERING CO.

Cleveland 10, Ohio • Offices in Principal Cities

The "Answer Man" for your operating needs

Behind every piece of equipment you purchase from National Supply is a plant and field engineering staff that's vitally interested in your experience with it. This interest pays off in many ways, too.

Perhaps you need special advice on the selection, installation and use of National equipment . . . or certain operating problems that require specialized, technical assistance. Wherever you're drilling or producing with National equipment, you're never too far from the practical aid that a National engineer can give. His work is part of a world-wide field engineering service that's available for one main purpose—to help operators do their jobs as efficiently as possible.

If one of National's engineers has given you direct help on a tough equipment application problem, you've already learned that he shuns the "standard" answers. He's aware that no two operating problems are identical. So he looks at yours in terms of specific circumstances, using his fund of experience only as a guide to its solution. He's there to help *you* with exact recommendations that are profitable to follow.

This helpful, practical approach to your needs is reflected in all National Supply products and services. It's in our seven plants, where constant research and development efforts are designed to bring you the most rugged, long-lasting drilling and production equipment you can use. It's in our 124 stores, where complete stocks of quality products are tailored to serve area needs as effectively as possible. Whether you need drilling, production or tubular equipment, you get the benefits of this outstanding supply service whenever you do business with National Supply.

THE

NATIONAL SUPPLY

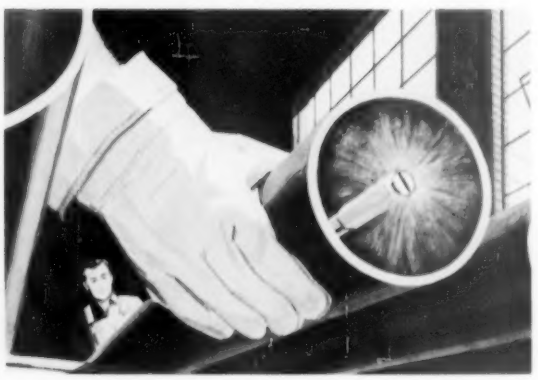
COMPANY

Quality, leak-resistant well condition . . .

SPANGSEAL TUBING

Field tests have proved that you'll minimize a host of common tubing troubles when you use Spangseal. This integral joint tubing

- Has 50% less connections
- Provides 100% resistance to leakage
- Provides more hole clearance
- Eliminates "hanging-up" while running
- Is available in grades J-55, N-80 and P-105 to suit every well condition



You'll get maximum corrosion resistance when you specify SPANG Plastic Coating!

Sixteen uniform coats of baked, phenolic plastic are applied to the interior surface after carefully-controlled shot-blasting and cleaning operations at the mill. Ask the National representative in your area about this service—and any other details you'd like to have about SPANG Tubing.

tubing for every

. .

SPANG EXTREME LINE TUBING

Particularly useful for producing deep wells and high pressure wells, this quality tubing

- Provides maximum running speed: fast joint make-up
- Has 100% joint strength
- Provides 100% resistance to leakage
- Has 50% less connections
- Provides positive shoulder contact engagement
- Has a streamlined exterior
- Is available in grades J-55, N-80 and P-105 to suit every well condition

THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
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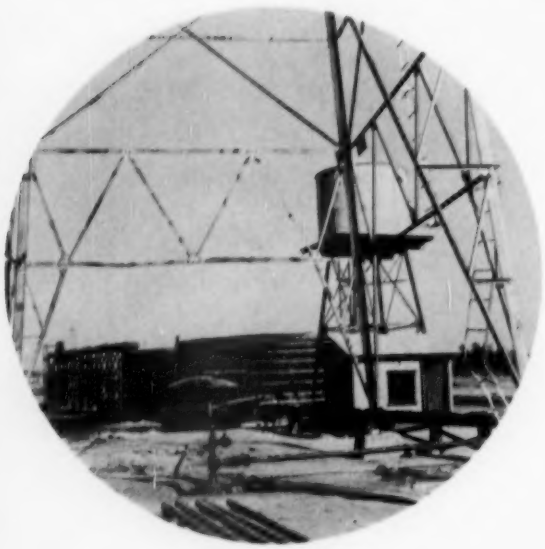
EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

ANOTHER IMPORTANT SPANG PRODUCT ON THE NEXT PAGE . . . . .

for low pressure refining lines . . .



water flooding . . .

roof rails and exhaust line . . .

SPANG®

CW STEEL PIPE

saves installation time wherever you use it!

You'll save valuable time when you use SPANG CW for these and many other applications because it's *uniform* in every respect . . . a result of quality-controlled manufacturing.

SPANG CW has strong uniform welds. During the forming and welding of SPANG Pipe, automatic heat control eliminates temperature deviations. This produces highest quality welds and insures uniform pipe strength throughout every length.

SPANG CW has uniform diameter. Finished pipe is carefully sized and straightened to insure uniformity. Careful testing and inspections eliminate any CW pipe that does not meet SPANG's high standards.

As a result, SPANG CW Steel Pipe is easy to work . . . easy to cut, bend, thread and weld. It saves time on the job, gives you faster installations—and it's built for years of rugged service.

On your next job, see how profitable it is to work with SPANG CW. You'll find it available in a full range of sizes at all National Supply Stores.

THE
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COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
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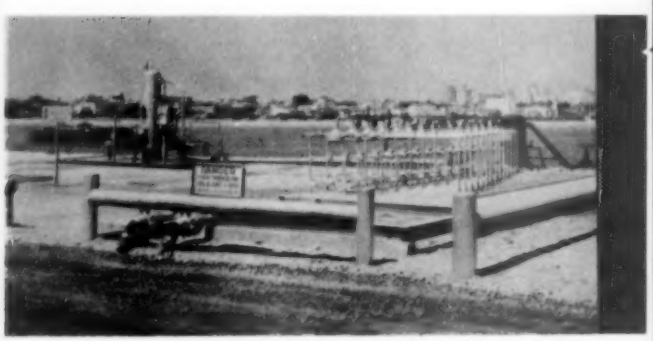
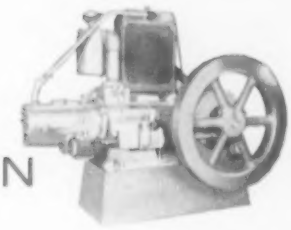
NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT



sub-surface hydraulic pumping . . .

Mr. MANAGEMENT MAN



You can save half the cost of the engine each year with Ajax and Gas

Well pumping costs depend largely upon the *power* you use.

It makes no difference to a pumping unit whether gas or electricity is turning the crank—but it can make a powerful difference to you: for instance, *thousands of dollars worth of difference per well* in every five-year period.

Use electricity, and you *pay extra*. Use natural gas with an AJAX engine and you *save* money every day, month and year. These are facts—hard, simple, inescapable.

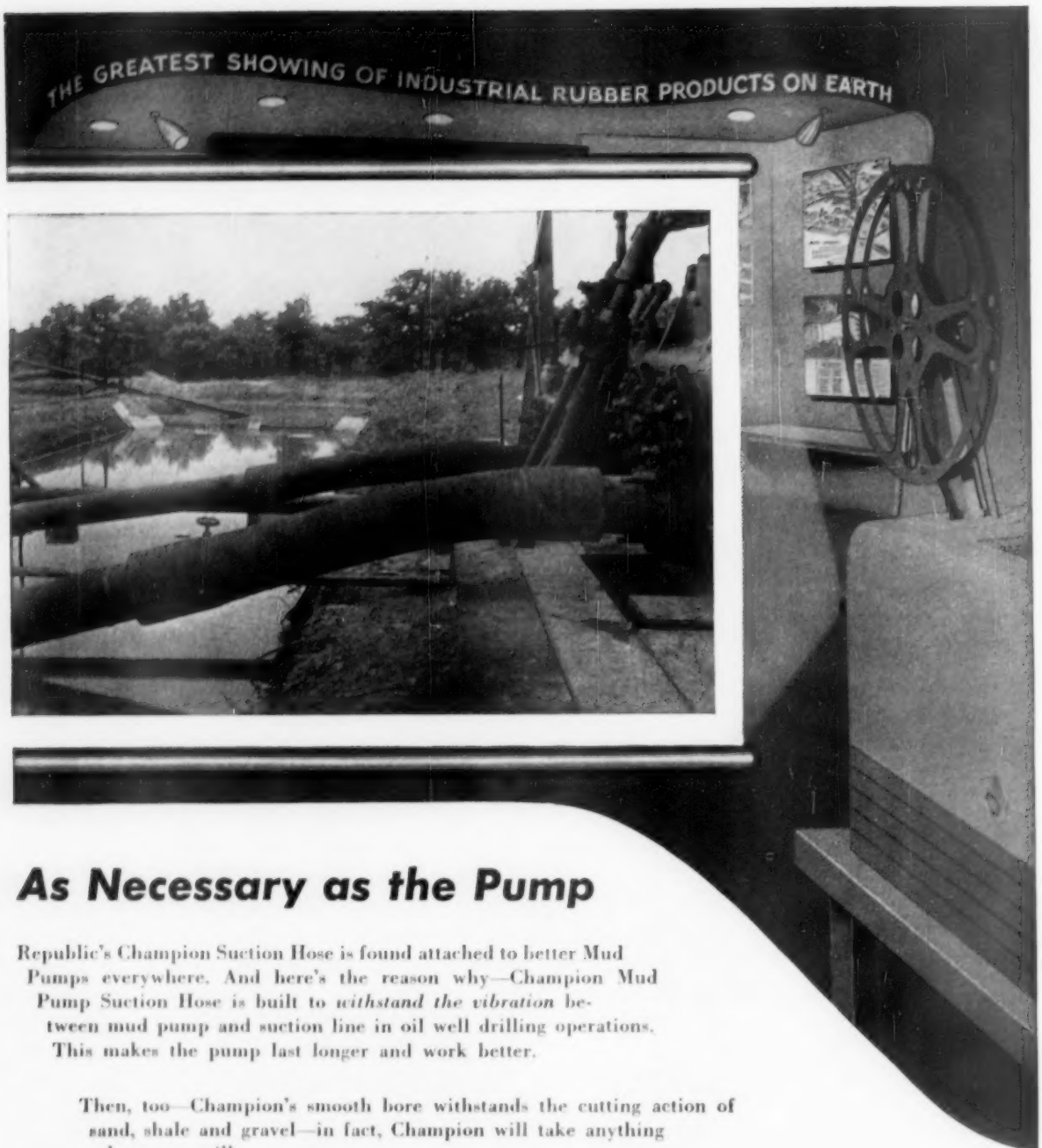
Do you want to get back the cost of a fine AJAX Engine in the first two years of operation—considering every factor of initial investment, supply lines, service, maintenance, and materials—and go on reaping an annual harvest of savings in years to come? See your Supply Man! And meanwhile, if you like cold facts, send us the electric power figures for the well with the best cost record in your operation (10 to 100 H.P.). We'll be happy to line up an AJAX-and-gas comparison, promptly.

Builders of GAS AND AJAX OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

AJAX IRON WORKS

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.; R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA



As Necessary as the Pump

Republic's Champion Suction Hose is found attached to better Mud Pumps everywhere. And here's the reason why—Champion Mud Pump Suction Hose is built to *withstand the vibration* between mud pump and suction line in oil well drilling operations. This makes the pump last longer and work better.

Then, too—Champion's smooth bore withstands the cutting action of sand, shale and gravel—in fact, Champion will take anything the pump will.

So—to keep your mud pump operating at top efficiency—ask your Republic Distributor about Champion Mud Pump Suction Hose as well as the other oil field workers that Republic makes for you.

"Quality Hose Builders for Over 50 Years"

MID-CONTINENT DISTRIBUTOR
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THE PROOF IS IN THE FIELD . . .

Carter

Long-stroke Hydraulic Pumping Units

Featuring the amazing Variable-Cycle Principle

Designed — Built — Priced FOR STRIPPER WELLS

CALIFORNIA

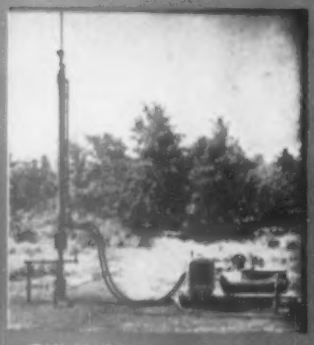
Carter Unit Pumping in Edna Field. Has been in service for seven years.

KANSAS

One of 4 units in the Great Bend Area, pumping from 3400 ft., owned by large independent.

EAST TEXAS

One of 8 Carter Units owned by a major oil company in Kilgore and Turnertown Areas. Pumping allowable from 3500 ft. Total cost about 60% of the cost of a conventional unit.



OKLAHOMA

One of seven units owned by an independent in the Tulsa Area, pumping from about 1500 ft. Operator reports production holding up better than offsetting wells with conventional units.

KENTUCKY

Carter Unit on 15-ft. substructure in the Green River Bottoms. Operator saved about 50% on substructure cost alone. This is one of seven units owned by this independent.

NORTH TEXAS

Major oil company installation in Caddo Field, pumping 30 bbl/day from 6250 ft. No rod failures in more than a year's operation. Total cost about 50% of the cost of a conventional unit.

CANADA

Carter Unit operating in 50 degree-below-zero weather in the Carbondale Field, showing adaptability of Carter Unit to extreme climatic conditions.

SOUTH TEXAS

Production increased from 3½ bbl/day to 6 bbl/day on this 2700-ft. well in the Duval County Area, when it replaced conventional equipment. This is one of 11 units owned by this independent.

WEST TEXAS

Carter Unit in the Spraberry Area, pumping from 7080 ft. This unit was installed for about 30% of the cost of a conventional unit.

MORE THAN 800 UNITS NOW IN SERVICE!
MORE THAN EIGHT YEARS OF FIELD EXPERIENCE!

From Canada to the Gulf, from Ohio to the Pacific, Carter Long-Stroke Hydraulic Pumping Units are saving thousands of dollars, for majors and independents alike, through lower first cost and maintenance as well as increasing production in many cases.

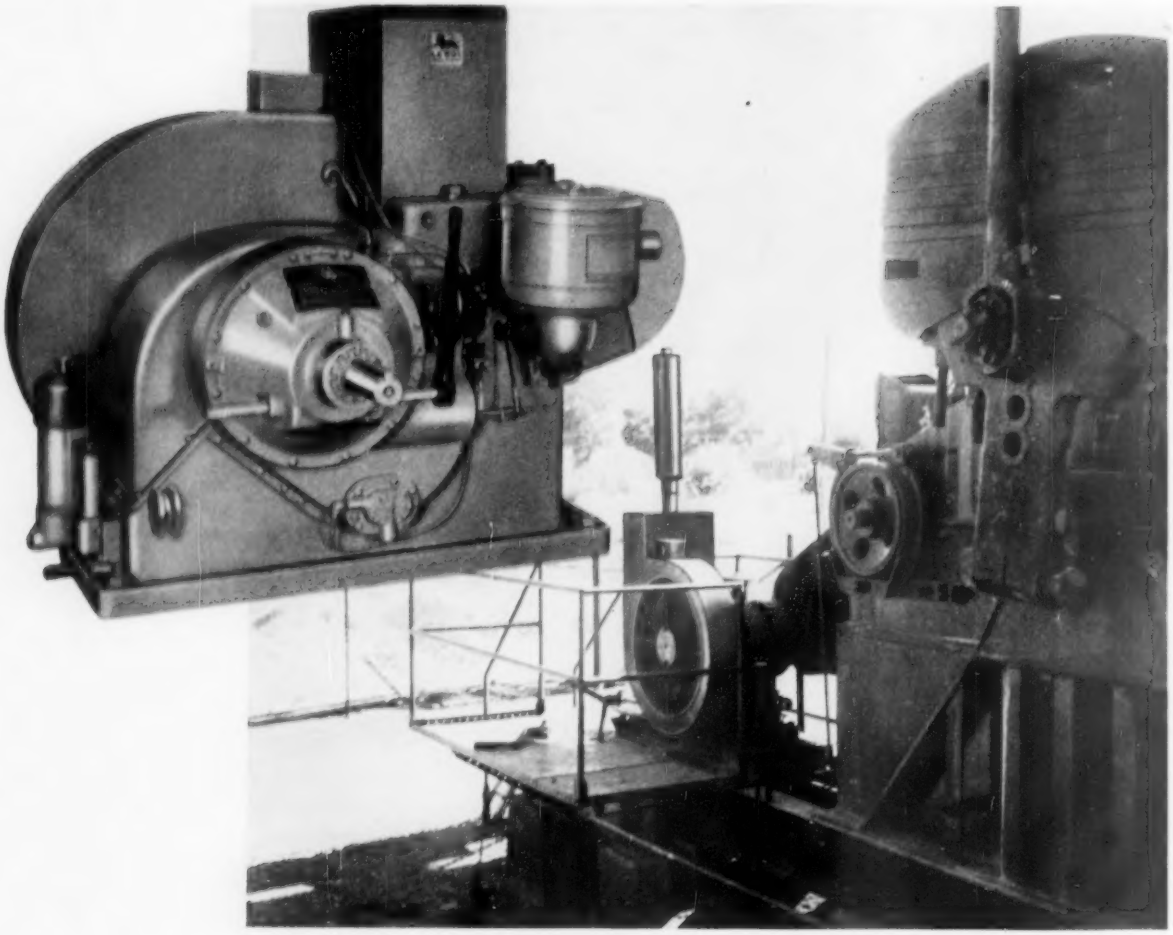
WRITE FOR BULLETIN PR-355

S. C. CARTER COMPANY, inc.
1900 Santa Fe Avenue • Los Angeles, California

Sales and Service Representatives in—

ILLINOIS, INDIANA and KENTUCKY—Brodhead Supply Company, Robinson, Salem, Ill.; Princeton, Evansville, Ind.; Irvine, Oil Springs and Owensboro, Ky. KANSAS, OHIO, and WEST VIRGINIA—Buckeye Supply Company, Arkansas City, Chase, El Dorado, Great Bend, Wichita, Kansas; Wooster, Zanesville, Ohio; Vienna, W. Va. MICHIGAN—The Stryker Supply, Mt. Pleasant. OKLAHOMA—A. D. Lerom Supply Co., Oklahoma City, Duncan; G & G Machine and Equipment Co., Hewletton. ARKANSAS, LOUISIANA, NEW MEXICO and TEXAS—Wilson Supply Company, Harvey, Houma, Lake Charles, New Iberia, Shreveport, La.; Alice, Barbers Hill, Bay City, Beaumont, Columbus, Corpus Christi, Dallas, Houma, Kilgore, Liberty, Odessa, San Antonio, Sherman, and Victoria Texas; Boston Supply Company, Borger, Texas. ROCKY MOUNTAIN AREA—Swan Specialties Co., Casper, Wyo.; Emrich Oilfield Management Co., Conrad, Montana.

EXPORT: COLOMBIA and VENEZUELA—Wilson, S. A. Caracas, Maracaibo and Puerto la Cruz. CANADA—LaGrand Ltd., Calgary; TRINIDAD—Wilson and Johnstone Ltd., Port of Spain.



Total Operating Cost Only 1.2 Mills per Hp Hour

. . . that's why it pays to do your pumping with Le Roi A288's

ACCORDING to the major oil company using this 26.3 max. hp A288, this operating cost is lower than that of any of their other engines.

And here are some of the reasons why the A288 cuts the cost of pumping — why it can run two weeks at a time without inspection.

Patented, "vaporizing-condensing" cooling system seldom needs make-up water. Uniform high temperatures reduce corrosion and sludging.

No superfluous acccessories like grease fittings, conventional-type fan and belts to need attention.

Generous crankcase permits long intervals between oil changes — and no shutdown is required to inspect oil level or add oil.

And performance-wise, you can't beat the A288, or the smaller 14.9 max. hp A114 sister engine, either. One typical installation has more than 47,000 hours on it. Stamina like this is one reason why the A288 is the only pumping engine recommended by a major user for continuous service *unattended for up to two weeks' time.*

Standardize on A288's and watch your pumping costs drop. You can get them from your supply house, or your Le Roi distributor. Or write us for our latest bulletin.

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin
Offices: Headquarters, Tulsa, Oklahoma

P-138

"Like getting the hole calipered FREE!"

...as a driller said recently.

Here's why no other caliper can match the

Johnston Hydraulic HOLE CALIPER

Whatever the hole condition, you can be sure of getting a complete picture with the Johnston Hydraulic Caliper!

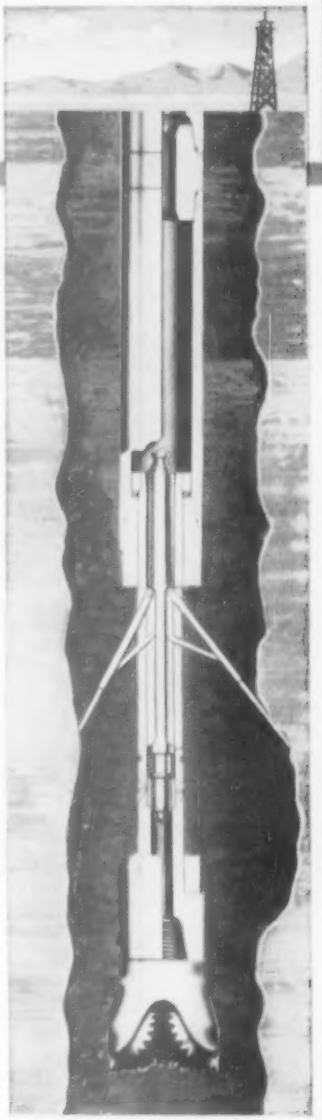
Saves time! No need to stop and rig up wire line. No delay or difficulty in crooked or directionally drilled holes.

Saves money! The *only* hole caliper that can often pay the cost of calipering in savings in rig time. The Johnston Hydraulic Hole Caliper is dropped into the drill pipe just before pipe is removed. Measures and records hole diameter as pipe is pulled from hole. Pipe may be rotated out in normal manner.

Accurate! Records continuous diameter of hole, bottom to top, either at detail speed or normal charting speed. Each measuring arm functions independently assuring the accurate measurement of irregular shaped hole.

Measures from the bottom! With the Johnston Hydraulic Hole Caliper, you can always be sure of starting to measure at the bottom every time.

When you get so many more advantages by using the Johnston Hydraulic Hole Caliper, why ever use less?



The Johnston Hydraulic Caliper provides accurate information on hole diameter from bottom to top. Information you can use with confidence.

WRITE OR CALL FOR DESCRIPTIVE FOLDER

JOHNSTON TESTERS

first in drill stem testing

FORMATION AND CASING TESTING — JOHNSTON

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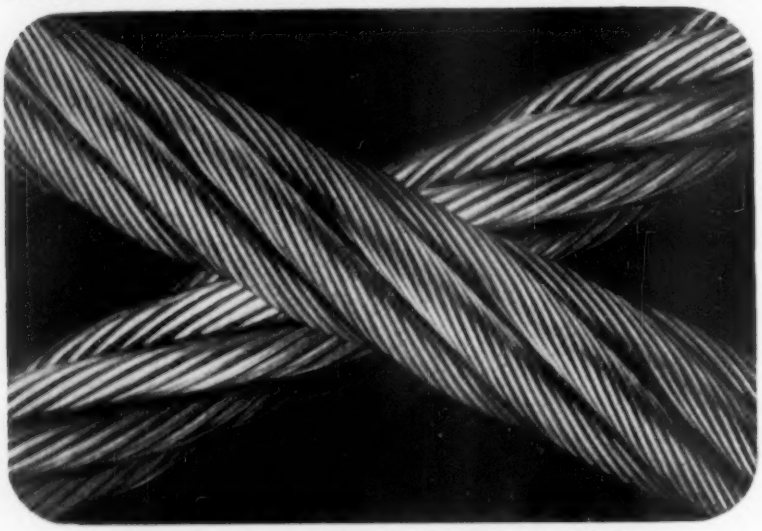
HC 551 LOS ANGELES, CALIF. • CALGARY, CAN.

FIRST WE DEVELOPED 1105 ROPE WIRE.



THEN WE MADE ROEBLING'S

Royal Blue

WIRE 1105 ROPE

1105 takes Royal Blue out of the ordinary wire rope class.

1105 is a rope wire that's new—that's stronger. It's the biggest news in many years.

1105 is the result of more than a century of research and development—it's the wire that gives Roebling Royal Blue the stamina that pays off in service.

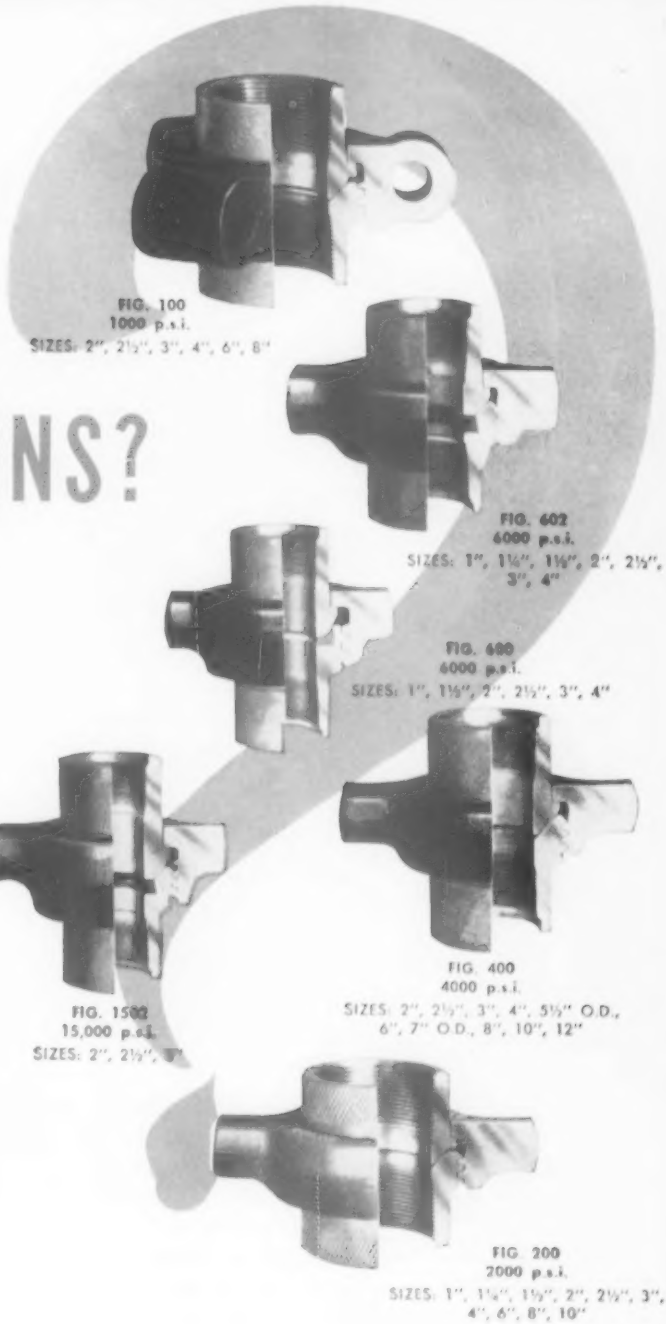
Contact your Roebling distributor or write us for the full story.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

WHY is it WISE to Standardize with WECO UNIONS?



• *Here is a trio of time-and-cost-trimming reasons:*

INTERCHANGEABILITY . . .

All WECO Union parts are interchangeable in the same size and pressure rating with complete assurance of a leak-proof seal. On lines that are made-up and broken-out repeatedly this, particularly, is a great time and cost cutter.

SERVICEABILITY . . .

The famous ball and cone seat . . . the tough Acme Threads . . . the rugged extra duty wing nut and heavier wall sections have made WECO Unions synonymous with service: long-lasting, leak-proof service you can trust on job after job.

AVAILABILITY . . .

WECO's wide range of unions in sizes from 1" to 12" — in pressures from 1,000 to 15,000 p.s.i. — assures you the right union for every job. And they are as close as your nearest supply store — wherever oil is drilled or produced.

• ***Whenever you need unions, see for yourself why it is wise to Standardize with WECO.***

U-8-55

PESA

WELL EQUIPMENT MFG. CORP.

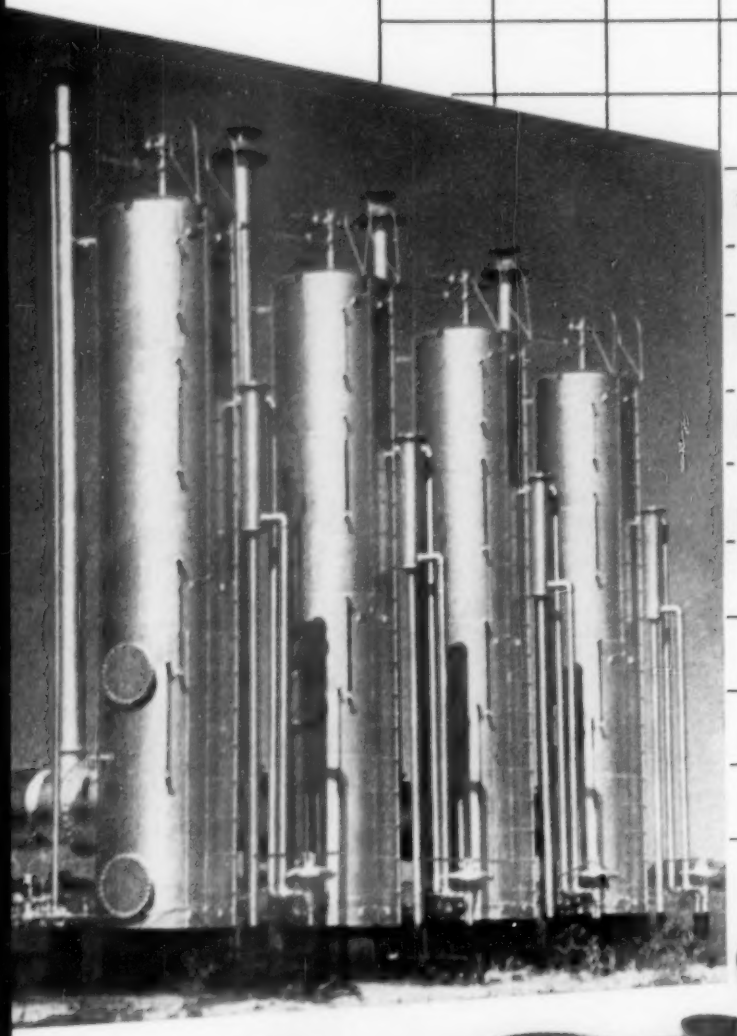
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

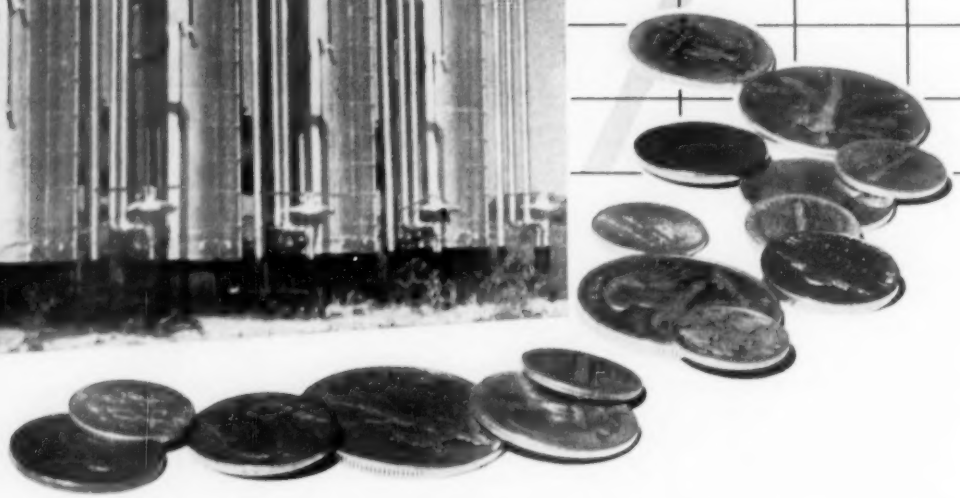
fmc

WECO

(R)



There's MORE for your money in PARKERSBURG Emulsion Treaters



• Parkersburg Emulsion Treaters are the deluxe type of the treater field. Like new model cars, they have all the "extras," but without the extra cost. They cost no more than comparative standard treaters of the same size.

With all of the extras of a deluxe model you get better emulsion and free water separation; more effective emulsion breakdown; more specific separation of emulsion into clean oil and water; greater maintenance of high gravity oil through conservation of lighter fractions.

Summing up, Parkersburg Treaters will handle a wider variety of treating problems with least auxiliary equipment. Size for size they will handle more fluid, do more heating, perform more efficiently and give you more for your money than you can get elsewhere.

Ask your Parkersburg Representative to outline all of the features of Parkersburg Emulsion Treaters.

Parkersburg
RIG AND REEL COMPANY
DIVISION OF PARKERSBURG : AETNA CORPORATION

PESA

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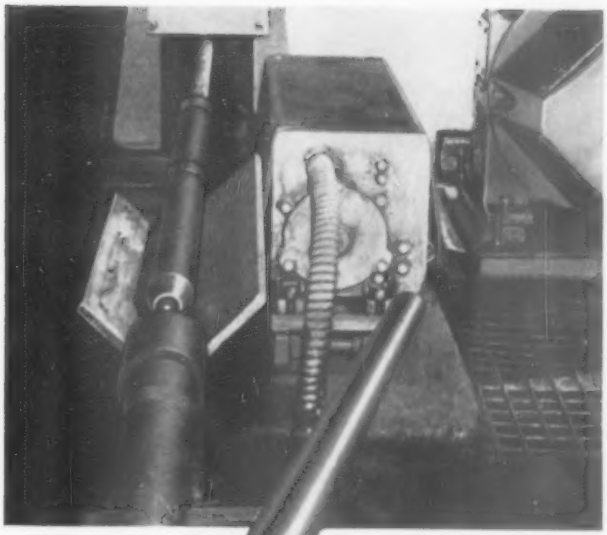
FORT WORTH, TEXAS

NO. 5503



CF&I

CASING *and* TUBING *is straight and "true"*

CF&I Seamless Oil Country Casing and Tubing is drift-tested to ensure straightness and accurate inside diameter.

CF&I's automatic drifter passes a long mandrel through each pipe to assure proper size. The mandrel, slightly smaller than the nominal inside diameter of the pipe, detects any variations in straightness or possible foreign matter . . . which are corrected before the casing or tubing passes this phase of inspection.

Drifting is only one of many tests conducted by CF&I to ensure that all seamless casing and tubing meets *or exceeds* the exacting API standards. Other tests include X-ray inspection, thread gauging, hydrostatic pressure tests and overall visual inspection.

CF&I Seamless Oil Country Casing and Tubing meets API STD 5A specifications—in sizes from 2⅜" O.D. through 9⅝" O.D.

3480

SEAMLESS TUBULAR PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION
Denver, Colorado

CF&I

"Imagination rules the world" . . .

BUT—you, as a reader of The Oil and Gas Journal,
won't get your money's worth out of the Big Yellow Book
if we editors just sit here and "imagine" what you want to read.
No sir, we need to *know* what you want . . . for sure!
To know what we should print to help you in your work,
we need to know who you are and what your job is.
That's why you can't buy the Journal on a news stand . . . we wouldn't know you.
We would have to just "imagine" what you might be interested in.

That's why you have to pay to get your Journal, too,
although we could send it to you free since it is the sale of
advertising that actually covers the cost of publishing.
But we know you (or your company) won't continue to pay for what you can't use.
So we can't sit back and "imagine" we're doing a good job.
We have to keep on our toes earning your paid subscription.
It is a measure of the quality of our service to you.

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we belong to the Audit Bureau of Circulations, a nonprofit organization
which audits our circulation records just as an impartial examiner
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Once a year the Bureau sends an auditor to our office.
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showing who each subscriber is, what his job is,
how much he paid, whether his subscription
is new or a renewal, and other pertinent facts.
There's nothing left to the "imagination"
when ABC checks a magazine. All the facts are there,
and they help guide us in editing the Journal
to fit the needs and interest of our readers.

The Oil and Gas Journal

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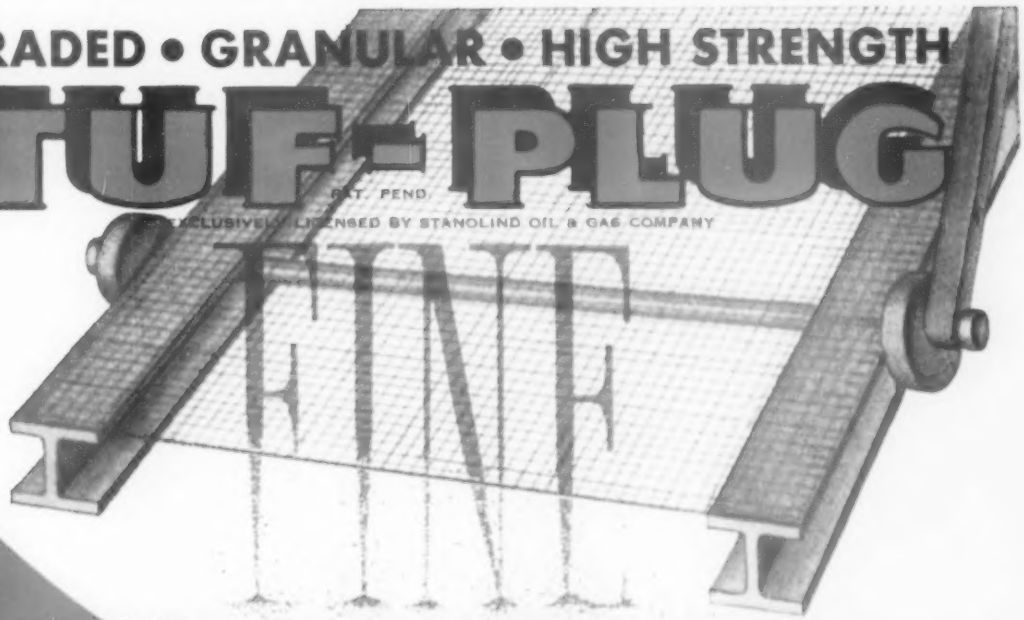
EXCLUSIVELY LICENSED BY STANOLIND OIL & GAS COMPANY

FINE



THROUGH THE SHAKER SCREEN

... engineered for lost circulation control

- ★ HIGHER STRENGTH SEAL
- ★ LASTS LONGER
- ★ SEALS F-A-S-T-E-R
- ★ LOWEST MAINTENANCE COST
- ★ PERMITS MUD WEIGHT BUILD-UP WITHOUT FORMATION BREAKDOWN

... and friction reduction

- ★ LOWERS DRILL PIPE TORQUE
- ★ DECREASES PUMP FRICTION
- ★ IMPROVES LUBRICATING PROPERTIES OF DRILLING FLUID

DRILL PIPE TORQUE REDUCED MORE THAN 65% IN THE FIELD! To a drilling fluid already containing diesel oil and graphite, the addition of 1 pound of Tuf-Plug Fine per barrel further reduced drill pipe torque from 3 turns to less than 1 turn.

Available through your local mud and service companies

CHEROKEE LABORATORIES, Inc.

HOME OFFICE AND MANUFACTURING PLANT IN TULSA, OKLAHOMA
BRANCHES: MIDLAND, OKLAHOMA CITY, CORPUS CHRISTI, NEW ORLEANS, LAFAYETTE, LA., CASPER

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with "GW" Cups

FLEXIBILITY

that means every-drop casing swabbing!

GUIBERSON "GW" CUPS

**hug casing wall—
automatic seal,
controlled pipe contact**

- Unequalled in rough or mixed casing strings
- Stout, flexible lip brings up every drop
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- Abrasion resistant compound — takes up own wear
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Guiberson Swab with "GW"
and "K" cups offers greatest
size range on the market.

Better Be Safe Than Sorry!

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ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere

They Say—

Need for Graduates

Dear Sir:

Congratulations on the editorial ("Petroleum's Most Basic Shortage") in the September 19 issue of The Oil and Gas Journal. One very important purpose of the Technical Information Center to be established in New Orleans is to help the people in the teaching profession.

Financial assistance to educational facilities would come from:

Payment for services in connection with operation of specific phases of T.I.C.

Fellowship grants for students.

Sponsorship of research projects at various universities in conjunction with work being conducted by the research organization.

Sponsorship of university chairs.

John R. Tusson
Pan-Am Southern Corp.
P. O. Box 2, New Orleans.

More From North Dakota

Dear Sir:

Your article on the exploration page of the September 12 issue points up very clearly the situation that many of us have observed and have faced only ostrich fashion. I certainly hope that enough of us get our heads out of the sand in time to head off this dangerous trend.

Thanks again for your courageous and timely article, and especially that incisive closing phrase, ". . . and hire a man for his brain and not for his brief case."

G. Wendell Smith
Consulting Geologist
Bismarck, N. D.

Praise for Engineers

"Mechanical engineers have been in the oil business from the beginning—from the early days when wells were only a couple of thousand feet deep to today's engineering marvels recovering oil from 3 miles down—from the simple separation in low pressure, low temperature equipment in the pioneer refinery to the high pressure, high temperature catalyzed processes of the modern refinery.

"Over this tremendous span of technological development, mechanical engineers have made significant contributions. Never before has any industry demanded more engineering talent than the oil industry. And the ultimate is far from at hand. New goals con-

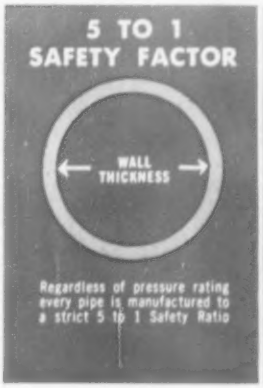
"Pressure Rated" Plastic Pipe

Job Engineered To Save You Money

Now, there's no need to buy expensive heavy-duty pipe for jobs with low pressure specifications. Southwestern's "Pressure-Rated" Plastic Pipe is Job Engineered to meet your specific needs. You select the Pressure Rating to do your job . . . you pay less because you don't buy wasted wall thickness.

You can count on "Pressure-Rated" Pipe . . . Guaranteed and manufactured to the rigid specifications that have made Southwestern the Quality Leader in the Plastic Pipe Field. And as for Safety . . . Southwestern "Pressure-Rated" Pipe is engineered with 5 to 1 Safety Factor.

Southwestern "Pressure-Rated" Pipe is available in 50, 75, 100, 125 or 150 pound pressure ratings. Call, write or wire today for complete information.


5 TO 1
SAFETY FACTOR
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Regardless of pressure rating every pipe is manufactured to a strict 5 to 1 Safety Ratio

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tinually present themselves in exploration, production, transportation and refining. The same skills and abilities that helped achieve today's high level of technical development will be needed to even a greater extent to meet the demands of the future."

H. J. Voorhies, vice president Esso Standard Oil Co. and general manager of Baton Rouge Refinery, in address to Petroleum Mechanical Engineering conference, New Orleans.

Record Claim Disputed

The September 19th issue of the Journal carried a feature on the gasoline plant of Gulf Natural Gas Corp. at Pine Island field, Caddo Parish, Louisiana. It was stated that this plant would serve more wells than any other plant of its kind in the world.

Here in West Texas we have two plants serving more wells: Phillips Petroleum Co.'s Goldsmith plant—2,431 wells; and Stanolind's Slaughter plant serving 2,450 wells.

Lynn Foster
Box 2576
Midland, Tex.

Solve Trade Ills at Home

"We have today just two outstanding advantages over other industrial nations: low-cost mass production and mass-buying power—the first of which cannot be sustained without the second.

"Far greater mass buying power—and thus far greater mass production with all its beneficial impact on living standards—could be developed throughout Western Europe in short order through the removal of 'the trade-throttling' restrictions and inequities existing in international trade among European nations.

"Until Western European nations make a concerted effort to fill in these sloughs in international trade among themselves, why should the United States tear holes in its own sound economy to offer superficial, short-lived aid through artificial trade?

"If free trade were the answer to prosperity among nations, then it should logically be practiced first among those nations living next to each other with similar wage levels, economic conditions and industrial philosophy."

Willard F. Rockwell, board chairman Rockwell Mfg. Co., in address before International Gas Union in New York.

Big Challenge Ahead

"The greatly shortened time factor in scientific and technological change has affected not only military planning. It has emphasized the need to preserve and strengthen our industrial potential within the framework of a re-

an ACCO product

Helicoid Gages

Exclusive HELICOID no-gear movement

For day-in, day-out Sustained Accuracy
—for the life of the gage—
HELICOID Quality costs you less!

• It's the basic design of HELICOID Gages that makes them outlast and out-perform ordinary gear-tooth gages. This enduring accuracy is evidenced by the smooth rotation of simple spiral roller and cam.

If you use gages it will pay you to investigate HELICOID performance records. There is a HELICOID long-life gage to meet every type of pressure indicating requirement. Ranges are to 20,000 p.s.i. and vacuum or compound.

Write today for Helicoid G-2 Catalog

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Wall or stem mounting cases—flush panel or flangeless cases.

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TRADE MARK

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Pressure • Vacuum • Compound

silient economy. To many observers, it is becoming obvious that a defense based upon powerful and costly weapons cannot be sustained by an economy that is weakened by dreams and schemes.

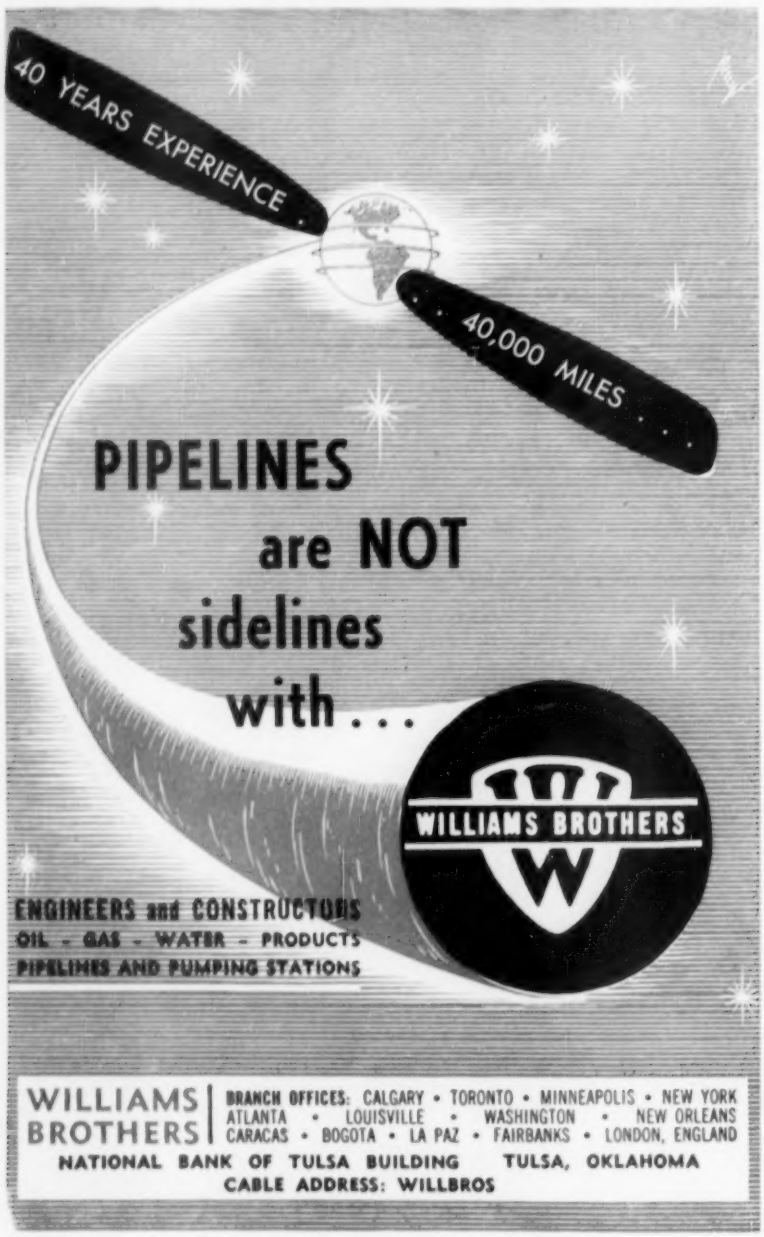
"In economic phraseology, for instance, there is a factor called 'the fourth dimension of economics' which applies to the degree of confidence incentive and initiative which national economic policies make possible. It is in this area of the 'fourth dimension' that our nation has an immeasureable advantage. Personally, I do not believe that any totalitarian system can maintain for a protracted period high standards of efficency and high rates of productivity.

"Sound economic progress is possible only through the incentives and advantages offered by a free economy —incentives in terms of living conditions, the advantages of thrift and investment and freedom of opportunity. Such factors build confidence and supply initiative. They are the intangibles of this so-called 'fourth dimension,' and the lifeblood of our economy.

"The challenge to your organization, to industry and to every citizen of this land, is to stimulate and preserve these factors. In matters of national security, as in matters of national progress, the right things will not just happen. They must be caused.

"If American industry is to continue as the most potent ultimate force in the world, then a better job will have to be done in protecting its inherent characteristics of investment, competition, service and profit. In area after area, economic as well as moral strength has been vitiated by reluctance to stand up for what was known to be right. How many citizens can say they have not at one time or another sacrificed principles in the face of what they thought was public opinion."

Clifford F. Hood, president United States Steel Corp., at dinner of National Security Industrial Association, New York.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sidelines
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CABLE ADDRESS: WILLBROS

CALENDAR

OCTOBER

12-14 Gulf Coast Association of Geological Societies, annual meeting, Buena Vista Hotel, Biloxi, Miss.

12-14 Gas Appliance Manufacturers Association, El Mirador, Palm Springs, Calif.

12-14 National Association of Corrosion Engineers, sixth biennial Permian basin tour, Lincoln Hotel, Odessa, Tex.

13-14 California Natural Gasoline Association, annual fall meeting, Ambassador Hotel, Los Angeles.

14 American Institute of Chemical Engineers, South Texas Section, 10th annual technical meeting, Galvez Hotel, Galveston, Tex.

14-15 National Society of Professional Engineers fall meeting, Peabody Hotel, Memphis, Tenn.

17-19 American Gas Association and Pacific Coast Gas Association, annual meeting, Ambassador, Biltmore, and Statler Hotels, Los Angeles.

18-22 National Safety Council, 43rd National Safety Congress and Exposition, Chicago.

18-21 National Association of Corrosion Engineers, South Central regional meeting, Shamrock-Hilton Hotel, Houston.

20-Nov. 3 Atomic Energy Exposition, Carnegie Endowment International Center, Nations Plaza, 46 St. & First Ave., New York City.

20-21 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Garrett Hotel, El Dorado, Ark.

21-22 Permian Basin Section, Society of Economic Paleontologists and Mineralogists, Permian field conference in Guadalupe Mountains, Carlsbad, N. M.

24-27 National Association of Railroad and Utilities Commissioners, natural gas panel discussion, Asheville, N. C.

27-28 Symposium on Formation Evaluation, Gulf Coast section, A.I.M.E., University of Houston.

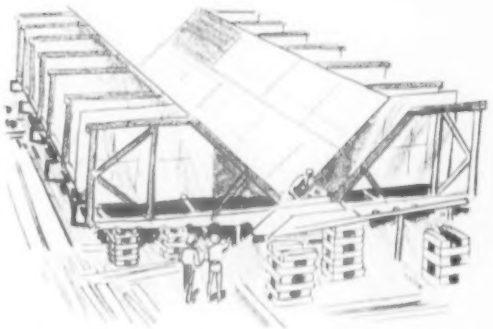
27-29 Rocky Mountain Oil and Gas Association, annual convention, Cosmopolitan Hotel, Denver.

28 Natural Gasoline Association of

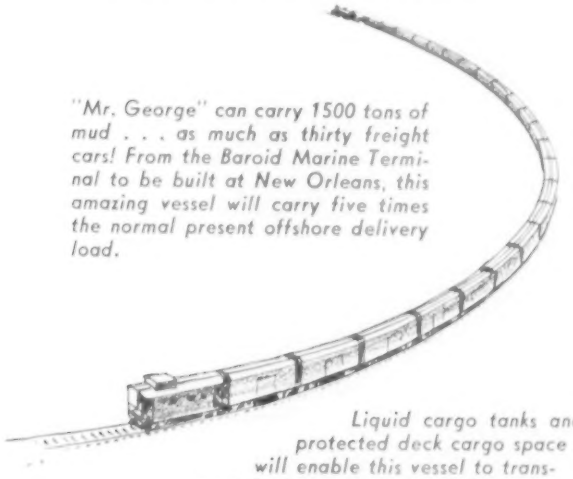
AMAZING

ANOTHER EXCLUSIVE BAROID SERVICE FOR THE OIL INDUSTRY!

DRILLING MUD VESSEL MAKES OFFSHORE DELIVERY OF BULK BAROID EASIER, SAFER, MORE DEPENDABLE!

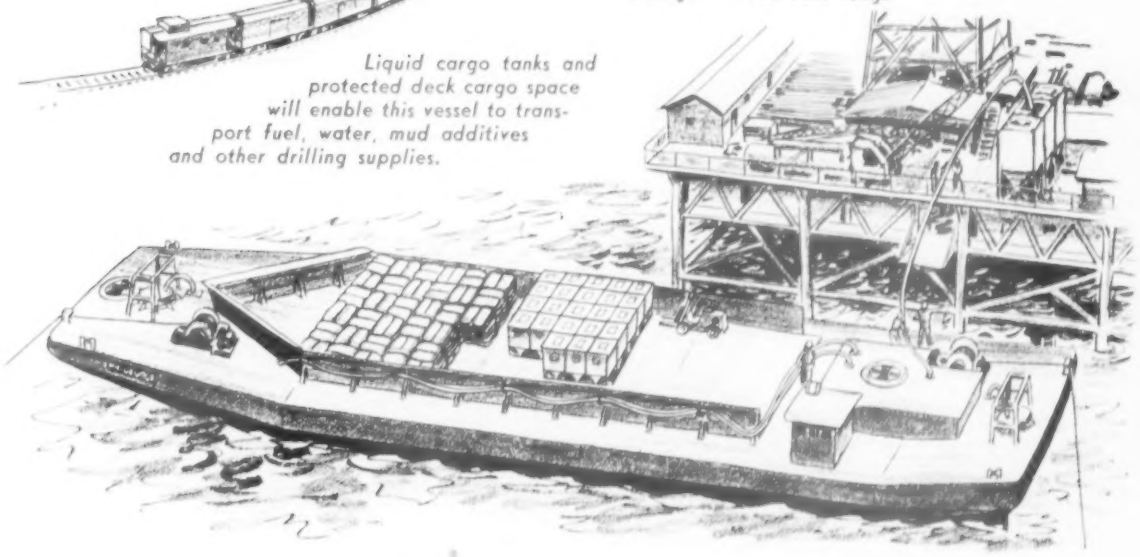


Now being built for Louisiana Gulf Coast service is Baroid's big offshore delivery vessel, the "George L. Ratcliffe." First giant vessel ever built solely for offshore mud service, the "Mr. George" is 196 feet long!



"Mr. George" can carry 1500 tons of mud . . . as much as thirty freight cars! From the Baroid Marine Terminal to be built at New Orleans, this amazing vessel will carry five times the normal present offshore delivery load.

Liquid cargo tanks and protected deck cargo space will enable this vessel to transport fuel, water, mud additives and other drilling supplies.



Giant outboard motors and 6,000-lb. anchors combine to maneuver and hold the vessel in delivery position without touching the rig. Patterned after Navy methods of refueling at sea, the "Mr. George" will pump 50 tons of dry bulk Baroid an hour through 200 feet of hose.

BAROID DIVISION
National Lead Company
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X Mayari and XX Rods Pump 5784-ft Well in Hulldale Field

Steady pumping, day after day, has been the rule since late January, 1954, when Well No. 3 of the Mrs. Viola McWhorter lease was put on pump, about 14 mi south of Christoval, Schleicher County, Texas. Since then the well, owned by Pan American Production Company, Houston, has pumped 50 bbl of 39.4-gravity oil and 2 bbl of water daily, from the Pennsylvanian Reef.

Well No. 3 is located in the Hulldale Field. It has a depth of 5784 ft, and is equipped with a Bethlehem 228 D-25S pumping unit, operating at twelve 64-in. spm. The sucker rod string, planned by Pan American's engineers, is made up of two types of Bethlehem Sucker Rods—⅞-in. XX carbon rods in the lower portion, and ¾-in. X Mayari nickel-chromium rods near the top, to combat the heavier loads.

Bethlehem Sucker Rods are made in a variety of carbon and alloy types, to meet various pumping requirements. Because of their durability and balanced chemical composition, they can always be counted on for dependable pumping service. Bethlehem also produces a full line of pony rods, pull rods, pony pull rods, and accessories.

If you would like to have detailed information about these products, get in touch with your Bethlehem sucker rod distributor. He'll be glad to answer your questions. Or just drop a line to the nearest Bethlehem sales office.

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America, southern regional meeting, Captain Shreve Hotel, Shreveport.

31-Nov.
1 Independent Petroleum Association of America, annual meeting, Jefferson Hotel, St. Louis.

31-Nov.
2 National Lubricating Grease Institute, annual meeting, Edgewater Beach Hotel, Chicago.

NOVEMBER

2-4 Society of Automotive Engineers, diesel engine meeting, Chase Hotel, St. Louis.

2-4 American Association of Petroleum Geologists, Mid-Continent regional meeting, Skirvin Tower, Oklahoma City.

3-4 Fourth annual instrumentation conference, School of Engineering, Louisiana Polytechnic Institute, Ruston, La.

7-9 Geological Society of America, Mineralogical Society of America, Paleontological Society, annual meeting, New Orleans.

9-10 Society of Automotive Engineers, Golden Anniversary Fuels and Lubricants meeting, Bellevue-Stratford Hotel, Philadelphia.

10-11 American Association of Petroleum Geologists, Pacific Section annual convention, Biltmore Hotel, Los Angeles.

11-13 New Mexico Geological Society, in conjunction with Roswell Geological Society, sixth annual field conference, Truth or Consequences, N. M.

13-18 American Society of Mechanical Engineers, 75th anniversary meeting, Hilton and Blackstone Hotels, Chicago.

14-17 American Petroleum Institute, 35th annual meeting, Mark Hopkins, Fairmont, St. Francis and Palace Hotels, San Francisco.

18-19 Society of Exploration Geophysicists, Southwest regional meeting, Dallas.

27-29 New Mexico Oil and Gas Association, Albuquerque, N. Mex.

27-30 American Institute of Chemical Engineers, annual meeting, Statler Hotel, Detroit.

DECEMBER

1-3 Interstate Oil Compact Commission, La Fonda Hotel, Santa Fe, N. M.

1-3 American Chemical Society, 11th southwest meeting, Shamrock Hotel, Houston.

2 Natural Gasoline Association of America, Panhandle-Plains meeting, Herring Hotel, Amarillo, Tex.

8-9 Oil Industry Information Committee meeting, Biltmore Hotel, New York City.

1956

JANUARY

9-13 Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich.

16-18 Pipe Line Contractors Association, eighth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

FEBRUARY

15-17 National Association of Corrosion Engineers Short Course for Pipeliners, Mayo Hotel, Tulsa.

19-23 American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York City.

24 Natural Gasoline Association of America, Permian Basin meeting, Lincoln Hotel, Odessa, Tex.

26-29 American Institute of Chemical Engineers, Statler Hotel, Los Angeles.

27-29 American Association of Petroleum Geologists, Rocky Mountain Section, Auditorium, Denver.

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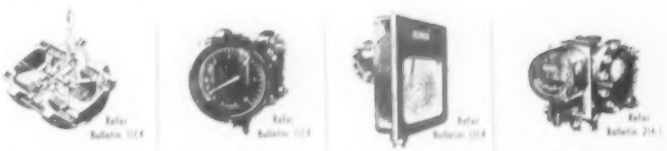
For further information request Bulletin 211-I or contact BARTON sales engineers in most principal cities.



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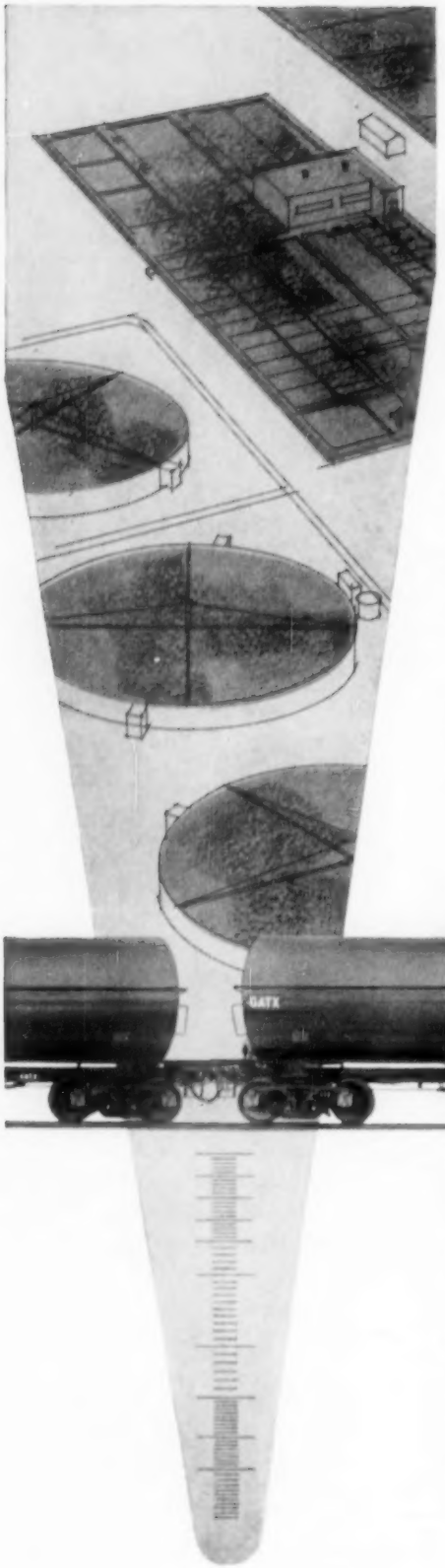

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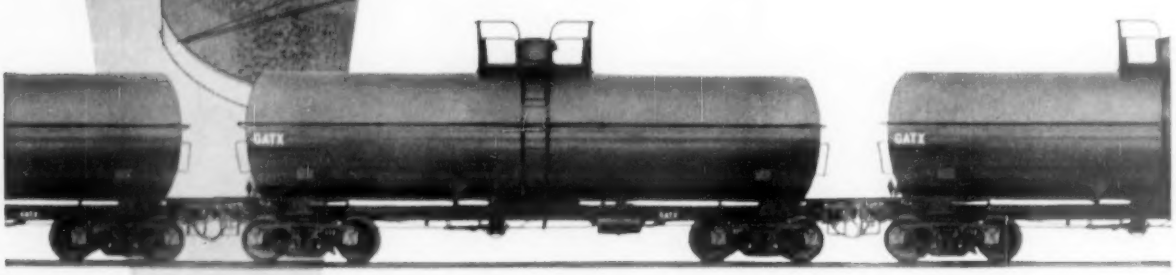

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING . . .

Journalistic Disconformity

A GOOD reporter always gets his story, and in a lifetime of oil reporting we have never yet come back without some kind of yarn that would read well in print.

So it was with jaunty confidence that we attended the meeting of the Alberta Society of Petroleum Geologists. Of course we aren't a geologist, but we'd covered various kinds of technical meetings before, and geologists weren't going to awe us a bit. We thought we knew enough about the occurrence of oil to cut through the fog of esoteric terminology and write a bang-up, interpretive, operating-level report on where to find oil in Canada.

So, armed with a big note pad and a supply of sharp pencils, we got to the meeting room early and carefully selected a chair right in the center where we could hear everything.

The first paper was something about the palaeobiogeography of the Jurassic stratigraphy, and while we were trying to figure out how to spell it the lights went out and a projector went on. It's hard enough to read our scribbled notes when written in daylight, but those we tried to take in total darkness were completely illegible. It was just as well, though, because we didn't understand a word the speaker was saying. Couldn't understand the slides, either.

This went on all morning. While we sat unenlightened in Stygian darkness, a parade of speakers prattled familiarly about the megafaunal zones of the nongeosynclinal border, the index microfauna of the major tectonic elements, and the correlation of the infaulted Carboniferous Banff equivalents.

When the meeting adjourned for lunch we overheard one delegate say that one of the speakers had thrown a bombshell into existing ideas about the Athabasca tar sands. Aha! We smelled a story. We buttonholed a wise-appearing local geologist and asked him about it.

"Well," he said, "if he threw a bombshell it went right past me. I couldn't make head or tail out of that paper. Micropaleontology is way over my head."

That made two of us. Persistent inquiry finally uncovered the fact that the speaker's conclusion was that a fossil heretofore believed to be one kind was really a different kind. This didn't seem to have any bearing on how to get oil out of the tar sands on a commercial basis. No story.

This went on for two solid days. Because we are a conscientious reporter (and because it was raining outdoors) we sat through it all—completely in the dark physically and mentally. Our notes (as nearly as we could decipher them between sessions) revealed such informative data as that the Lithostrotion-bearing biostromes are intercalated in the lower portion, that the lithologic character of the late Jurassic epeirogenies is indicated by Kimmeridgian fauna, and that in some sections the Banff rests disconformably on the Palliser. We rested disconformably on a hard folding chair.

We were licked. We confessed complete, abject, unconditional defeat. Not a line of printable copy to justify the expense account.

Timidly we asked a prominent Canadian oil geologist to summarize the meeting for us. "They're having some difficulties with correlation and nomenclature, but it's all beyond me," he said. "I'm interested in oil, not fossils."

Our chin rose a few inches off the ground at that, emboldening us to interrogate some Oklahoma geologists who were present. "It may be hot stuff locally, but it's all Greek to us," they replied. "We just came up here to see the mountains. We agree with Bill Skelly's classic instructions to his geological department—'I don't care if you find it in a pile of manure so long as it's oil.'"

We began to feel like a human being once more. But we really threw back our shoulders and lived again when an exceedingly successful oil geologist of great prominence and world renown sidled up to us and whispered: "Did you ever hear anything so futile? They've been talking for 2 days and have yet to mention the word oil. I'm going out and investigate some interesting fauna of the species Rainbow."

The next meeting of geologists will be reported by Dr. Frank J. Gardner, our chief staff geologist and exploration editor. He can speak their language.

—*Henry D. Ralph.*

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but only from the area to be cemented

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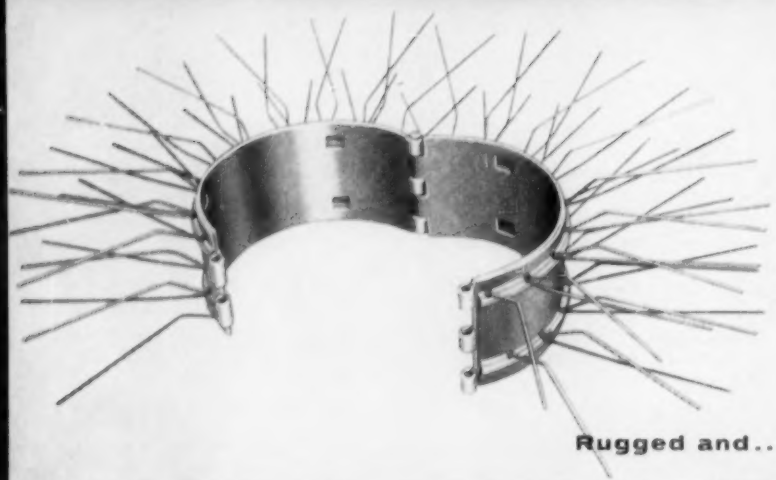

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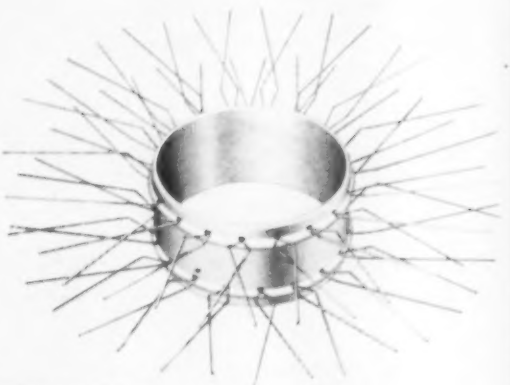

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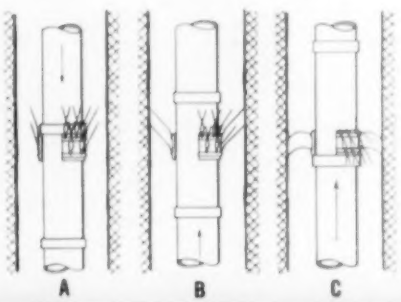


BAKER
WALL SCRATCHERS

EDITORIAL

Taking some mystery out of the oil business

THE public-relations man for a large oil company answered the long-distance phone. A company man in a small town down state began:

"You've got a public-relations problem here, and you'd better come down and straighten it out. The company's in dutch with the local authorities because . . ."

"Wait a minute," interrupted the PR man, "I don't have any public-relations problems. **You** have a public-relations problem, and **you've** got to straighten it out. The company may have public-relations problems, but I don't. All I can do, or will attempt to do, is to give company men some advice and perhaps a little assistance now and then on **their** public-relations problems."

That conversation epitomizes the role of the nation-wide Oil Industry Information Committee and its relationship with the entire petroleum industry.

THE INDUSTRY HAS PROBLEMS—jillions of them—in maintaining good relations with the public from the neighborhood level to the international level. But a few-score public-relations men, or even a huge committee like the O.I.I.C., can't solve them.

All the O.I.I.C. can do, or attempts to do, is to conduct a program of education. It has two prongs to this program:

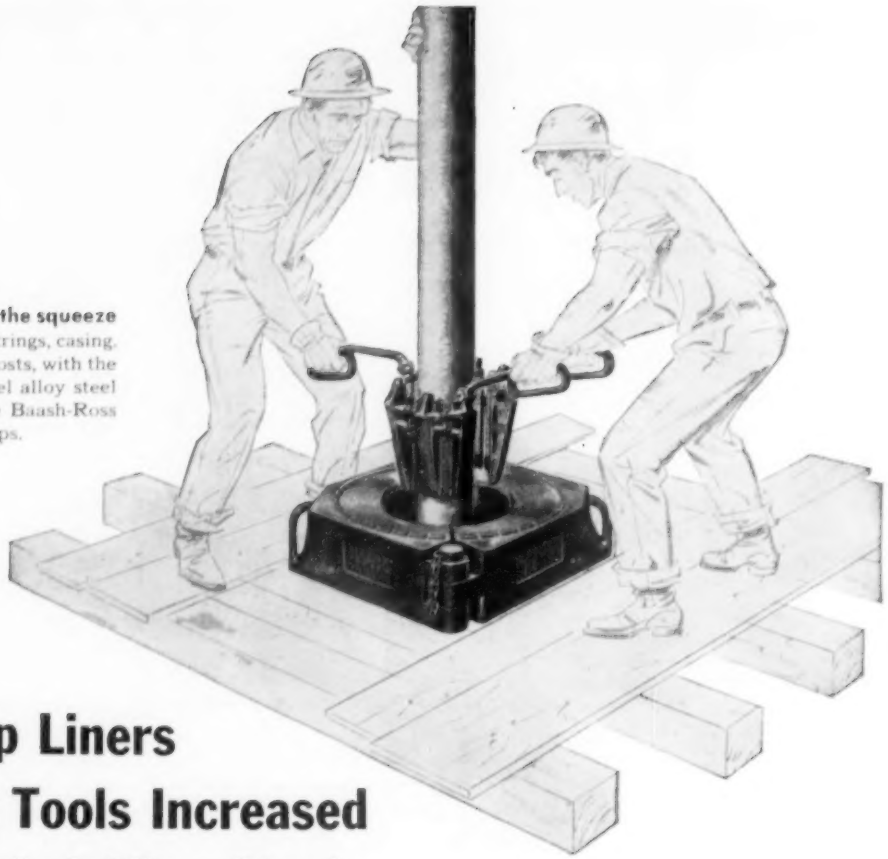
- Inform the public on the facts of petroleum;
- Educate oil men on how to get along with the public.

Its information program is soundly based on the premise that those who know us well think well of us. Oil has always been a mystery to most people, and oil men have not been very good at explaining their activities. So unwarranted conclusions and prejudices developed.

The way to dispel the mystery is education, and there is no royal road to learning. The O.I.I.C. has a painstaking and continuing task in using every means of communication to put factual information in the hands of people who need it most—which is practically everybody. It is doing the job well and getting results.

THE OTHER PART OF THE JOB—educating oil men about the public—is also progressing. The public has been about as big a mystery to oil men as oil has been to the public. But the O.I.I.C. is showing oil men how to tell their story to their neighbors and public officials, how to win friends and influence people, how to head off public-relations problems before they become acute.

That's as far as it can go. It can't put out every fire of public indignation kindled by some oil man's blunders or carelessness. With the O.I.I.C. showing the way and laying the groundwork of public information, it's up to individual oil men to maintain their own good relations with their own publics.



Drillers put the squeeze on drilling strings, casing, tubing and costs, with the help of nickel alloy steel liners in the Baash-Ross family of slips.

Life of Slip Liners and Fishing Tools Increased by using Nickel Alloy Steel

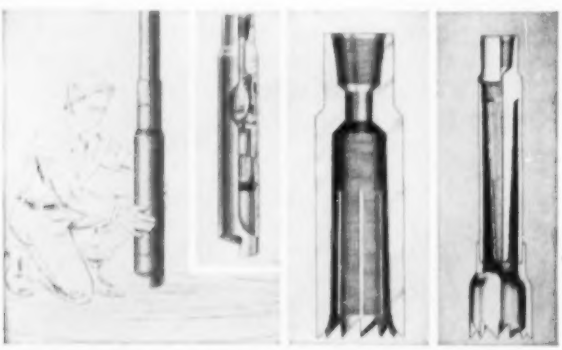
Case Hardened nickel alloy steels provide high surface hardness that resists wear, abrasion and spalling. In addition, the supporting core has ample toughness to withstand severe sudden shocks and overloads encountered by oil well tools.

That's why slip liners and fishing tools developed by Baash-Ross Tool Company of Los Angeles, California, are fabricated from carburized nickel alloy steels.

For slips that give oil men the utmost in dependability, Baash-Ross specifies liners in a nickel steel that resists torsional, tensile and compressive stresses. Resistant as well to abrasion and impact, these liners with their supporting slip bodies come in sizes to fit drill pipe, casing or tubing from 2⅜" to 20" in diameter.

Carburized nickel alloy steels play important roles in other Baash-Ross products. Their fishing tap is typical. Basically it is a long tapered thread for insertion into pipe or the like. After taking hold of the "fish", a tap is often jarred to loosen the fish before lifting it from the well. Nickel alloy steel completely meets requirements for a hard, stress-and-shock resistant tap material.

Improvement of specific properties in a steel may be obtained by the use of nickel either alone or in combination with other alloy elements. Accordingly, when you want the best set of properties for meeting your particular needs, investigate nickel alloyed steels. Whatever your metal problem, send us details for our suggestions.



Recovery of parts detached or broken off from a string calls for rotary sockets, die collars or fishing taps such as those shown above. Each combines a hard, wear-resistant surface supported by a tough core. Baash-Ross engineers find Type 4615 nickel-molybdenum steel, case hardened, meets this need. For rotary socket slips, which actually grip the fish, Type 3115 nickel-chromium steel, case hardened, is frequently specified.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

Current and significant in . . .

The Industry This Week

Labor

● **Look for the shortage of engineers to get worse** before it gets better. Oil companies are beginning to take some steps to help solve the problem, but any solution will be years in paying off. The basic problem: Too few high school students are being interested in science as a career. P. 102.

Union local at Gulf's Port Arthur, Tex., refinery has handed management a surprise wage package. Proposals include a 15-cent hourly pay hike, double overtime pay, triple holiday pay, higher shift differentials, more holidays and vacations, severance pay and more plant privileges. Outcome may set pattern for future wage talks in entire refining industry. P. 94.

A 2-month strike at Republic Oil Refining Co.'s Texas City plant has been settled. The company agreed to pay wages of a full-time union plant steward. This is believed the first such contract clause in the refining industry. P. 95.

Pipeline

● **T.G.T. lays plans for 1,112-mile** Nashville to Manitoba natural-gas line before FPC. And fireworks are sure to pop. Midwest pipelines whose markets T.G.T. will invade will not take it lying down. The deal calls for importing 200,000,000 cu. ft. daily of Alberta gas, which could pave the way for starting Trans-Canada Pipeline. P. 90.

Exploration

● **The C.A.T.C. group has a discovery** in the deepest water ever explored by oil men. The offshore wildcat flowed 38.7°-gravity oil at the rate of 405 bbl. daily on a drill-stem test at 13,614-20 ft. The test was made through a 10/64-in. choke. The well is in Block 47 of the Grand Isle area 18 miles off Louisiana. The group holds about 50,000 acres surrounding the discovery.

A second producing formation only 40 ft. below the 4,906-ft. discovery sand is the latest news from Israel's first oil well. The new pay tested about 50 bbl. an hour and is better quality oil than the 30°-gravity crude found in the upper sand. P. 108.

Alabama's first significant oil well has been completed as a dual producer. The Zach Brooks 1 Donovan, 25 miles north of Mobile, tested three zones from 10,868-959 ft. It flowed 45.1°-gravity oil at the rate of 343 bbl. daily. Perforations in the interval of 11,275-414 ft. flowed at rate of 53.5 bbl. daily. Gulf Refining Co. already has spudded in its 1 Citronelle Unit one-half mile south as an offset.

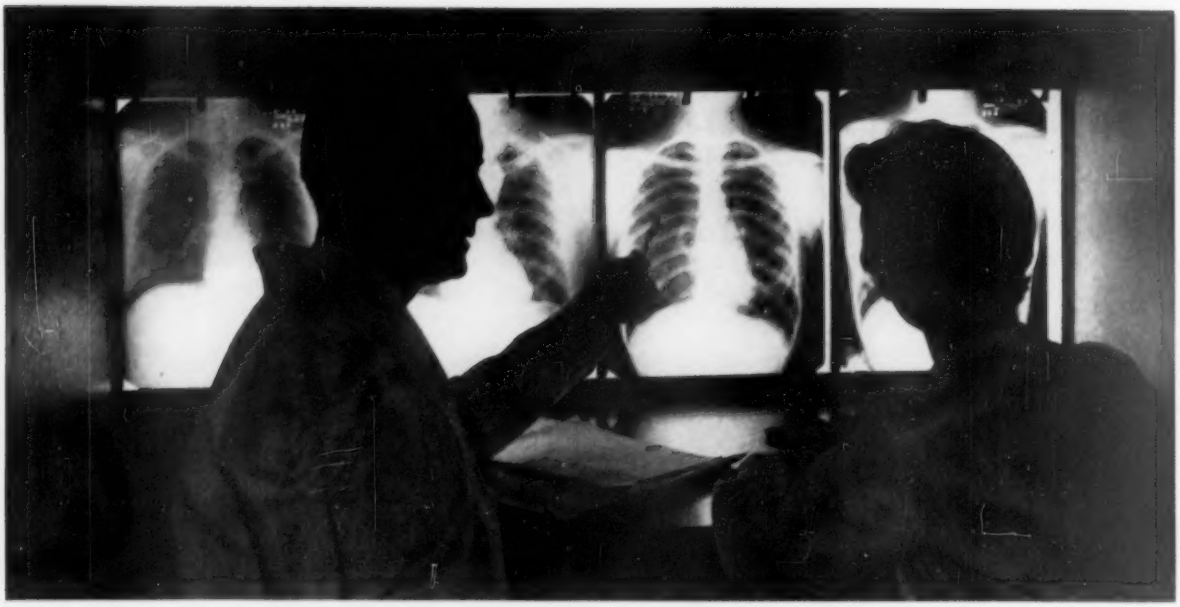
Processing

● **Hercules Powder will manufacture a new low-pressure polyethylene** called "Hyfax." The product will be turned out at a $10,000,000 plant in New Jersey using the Ziegler process under contract with a German company. The move marks Hercules' entry into a new chemical field. P. 104.

Economics

● **The gasoline market is still strong in most areas,** thanks to heavy buying by Indiana Standard. It is now estimated the company has acquired 4,500,000 bbl. of products on the spot market or through trades or loans to fill the gap caused by its August 27 fire at Whiting.

Runs to stills at Whiting were scheduled to be increased to 150,000 bbl. daily on October 15, but the company still will be a large buyer of products.



DR. R. J. POTTS, Magnolia's medical director, and nurse examine X-rays in well-equipped laboratory.

Magnolia Medical Plan Paying Off

- **In cash, alone, the company figures it is saving at least $250,000 a year by reducing employe absenteeism**
- **More valuable, but less tangible, is addition of years to the lives of top employes at their peak of efficiency**

Robert J. Enright

DALLAS. — Preventive maintenance, which has saved millions of dollars worth of oil equipment, now is being applied to oil people—with results just as good.

At least six oil companies, reasoning that their experienced personnel is their greatest asset, have launched preventive medical programs to see that their employes live longer and stay healthier.

Pioneers in the field are: Magnolia Petroleum Co.; Socony Mobil Oil Co.; Phillips Petroleum Co.; General Petroleum Corp.; Standard Oil Co. (N. J.); and Humble Oil & Refining Co.

Setting up such a program means hiring specialists in the field of industrial medicine. It means organizing a medical department complete with staff and facilities.

This takes money, but it's really not costing the companies a dime. The few such programs now operating not only are paying for themselves but saving their companies millions of dollars.

The companies figure that the greatest value of the programs, however, is intangible and can't be measured in dollars and cents. It lies in adding years to lives of employes whose experience can't be replaced.

Magnolia Petroleum Co. is sold on a program it started about 2 years ago. Magnolia can show you where this program already has saved or prolonged a great many employes' lives. Along with this, the company is saving an estimated $250,000 a year through use of its own medical staff, by cutting cost of employe replacement, etc.

There are other benefits, hard to measure dollarwise.

Magnolia has found that its program has cut absenteeism due to such things as colds, earaches, etc., slightly more than 20 per cent.

Magnolia also has found, in the 2 years since its medical department was established, that fewer industrial accidents have occurred. Savings here in manpower and equipment losses and in compensation insurance payments, though intangible, are known to be substantial.

This isn't just a coincidence. The department has worked out a set of physical standards for each job—from driller to truck driver to janitor. To hold down a job, a man must meet these standards.

The company thinks it's bad business to entrust a $1,000,000 or so rotary rig to a driller whose vision or hearing has deteriorated badly, or a $10,000 truck to a driver who has fainting spells.

The need is seen . . . Industrial medical departments and programs are for the most part a development of the past few years.

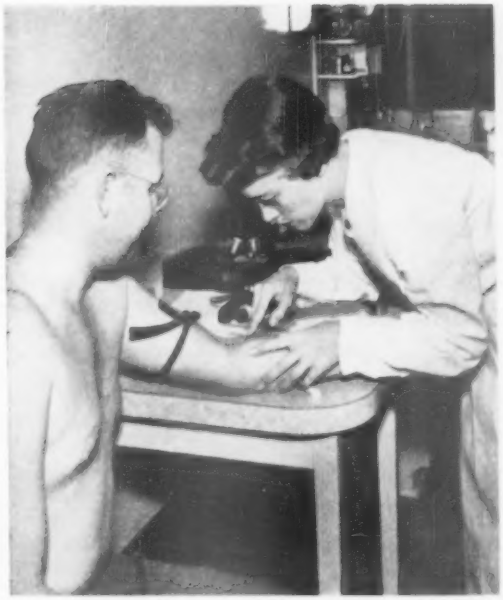
Oil companies began to realize during World War II's general personnel shortage that a firm is no better than the whole of the roustabouts, tool pushers, engineers, executives, and the other employes which comprise it.

They found that a company prospers because all of these employes make up a productive team—that the better and more experienced the workmen, the better the team and the bigger the profit.

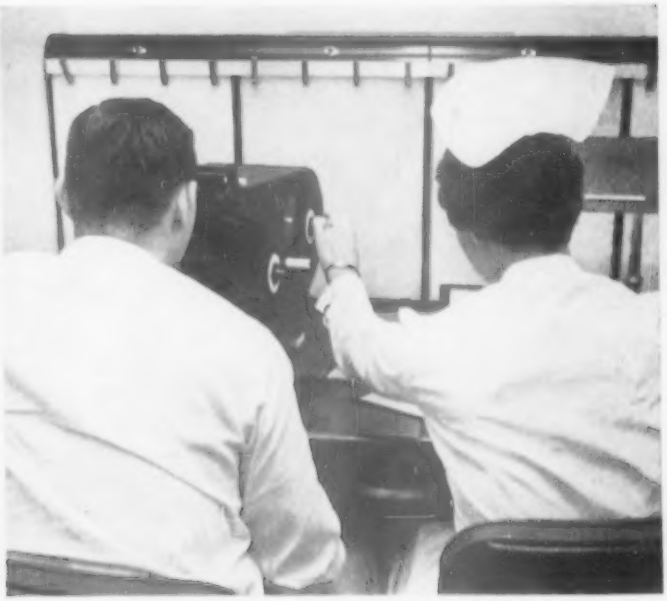
Several years ago, the chief threat to experienced personnel appeared to be poor equipment, poor lighting, inadequate safety precautions, and the like. Industry tackled these problems energetically. And the number of lost-time accidents due to these things has decreased steadily.

While industrial accidents declined, however, oil and other companies were losing ground on another front.

Employe strain from high postwar production rates began to show in the



BLOOD workup is part of Magnolia's free annual physical.



VISION gets careful check from Magnolia's industrial nurse.

form of sharp increases in the number of cases of heart attacks, hypertension, ulcers, and tuberculosis.

Worried companies began to study this situation and came up with a startling figure—only about 5 per cent of employe lost time was due to the nature of the occupation itself, or, in other words, to industrial accidents. The rest was absenteeism which was due principally to disease of one sort or another.

What to do about it . . . There are a good many obstacles in the way of setting up an efficient company medical department.

Pioneer companies in the field first had to decide how far they should go. It obviously would be physically and financially impossible to set up a department big enough to treat the diseases of thousands and thousands of employes scattered all over the United States and in many foreign countries.

Even if this could be done, treating a disease wouldn't help much because that could be done just as efficiently or more so by medical specialists outside the company.

The important thing to these companies was to prevent disease. This could be done in part at least by providing, regularly and frequently, free physical checkups for every employe. Moreover, it could be done by a relatively small medical unit.

How one program was set up . . . Magnolia's medical program has been functioning long enough now to realize some of the fruits from it. The company began with the idea that its program should be molded on these four premises. It should:

. . . Be voluntary. The company felt that employes would cooperate better if the program wasn't put on a compulsory basis.

. . . Prevent not cure disease. The department should search for disease but leave treatment of that found up to the family doctor. There also should be free exchange of information between the department and the family doctor.

. . . Benefit all employes.

. . . Operate on ethical basis, where findings would be kept in confidence as between patient and family doctor. All records on physical checkups and disease case histories should be kept in confidential files available only to the medical director.

R. J. Potts, a dynamic young M. D., took over as Magnolia's medical director in September 1953. A sizable chunk of the eleventh floor of Magnolia's headquarters office building in Dallas was transformed into a completely equipped medical department.

The department is staffed by Dr. Potts, a registered lab technician, an industrial nurse, a medical secretary who handles appointments and correspondence, and a field secretary who takes care of field files and calls from the field.

The department aimed at giving as many Magnolia employes as possible free physical checkups every year. It began immediately to do this as its first step. Later on, the department would tackle three other programs: Disease education, rehabilitation of employes who had had disabling diseases, and preparation for retirement.

The physical . . . The free yearly physical was offered first to the roughly 1,800 employes in Magnolia's Dallas area. This takes in those in the company's 26-floor home office building (including employes of Magnolia Pipe Line Co.), of the field research and geophysical laboratories, and the bulk terminal.

The department decided to split the 1,800 into 12 groups and try to run one group through each month. To make this easier, each group was given a different color code. The employes scheduled to receive physicals in September were mailed notes saying that they should make appointments before the end of the month.

The response was terrific. So much so that the department was unable to complete the first round of physicals until last May. It hopes, now that the program is well under way, to be able to finish the present round faster.

When a Magnolia employe goes for his checkup, he gets a good one. His vision is checked thoroughly. If he needs glasses, he is sent to his family doctor to be fitted. His hearing gets careful attention. So far as is known, Magnolia's medical department is the only one which runs audiograms to check hearing of company employes.

The physical also includes chest X-rays, blood workups, and examination of urine. These examinations have picked up cases of anemia, leukemia and other cancers, tuberculosis, latent infections, diabetes, and kidney and bladder diseases. All of these can ma-

HEARING of employe is tested with an audiogram. Magnolia is believed the only company to test hearing so thoroughly.

terially shorten an individual's life, and all were found early before any symptoms were noted by the individual.

Any employe over 40 years old also has his heart checked via a cardiogram (electric tracing of the heart). These have revealed many unknown heart abnormalities which can and have been corrected before they could develop into something serious.

Box scores on just a few of the diseases found in 2 years are surprising. During this period, the Magnolia physicals detected: 133 cases of hypertension (early heart disease and potential heart-attack victims); 30 tumors (of thyroid, prostate, rectum, and breast); 6 cancers (of bone, lungs, stomach, larynx, and prostate); and 30 duodenal ulcers.

Most of these are potential killers, and all were detected early enough to be cured.

Rehabilitation . . . An important part of Magnolia's medical program is its effort to put an employe back to work when he has had a disabling disease or injury—if not in his old job, then in one he is physically capable of handling without danger to himself or his co-workers.

Not so long ago a man who had a heart attack was through so far as most companies were concerned. This is true in some industries even today. Not so at Magnolia. In 1 year 41 of its employes suffered heart attacks . . . 36 of them are back at work.

Dr. Potts points out that the average heart-attack victim is about 50 years old. Such an employe has years and years of experience behind him and probably is near the peak of his value to the company. Conversely, a 50-year-old with 15 years to go before retirement can ill afford to lose a position and salary he worked many years to attain.

Supposing a Magnolia production superintendent suffers a heart attack. When the family doctor finishes treating him, he is examined by Dr. Potts or by a company-retained cardiologist. He is accompanied at this examination-interview by a company man who describes the employe's job—neither exaggerating nor underestimating what the job requires the employe to do.

The doctor determines the employe's work capacity. If the described job is within his labor limit, he is permitted to go back to it. If not, line management consults with the medical department and the employe himself to see what the latter can safely do.

A driller with a chronic eye infection may be put to pumping or in warehouse work where poor vision does not endanger co-workers.

Where disabling diseases or injuries hit men in the field, Magnolia calls on one of 400 private-practicing physicians to examine the man. Results of the examination are relayed to Dallas and studied by the medical department. The department then determines whether the man is fit to return to his former job.

The same procedure is followed in hiring new employes. The examination is made in the field, sent to Dallas, and the medical department then states in a return letter whether the applicant is qualified for the job, qualified with limitations, or disqualified.

The department in the latter cases works closely with the personnel department. The applicant's mental or emotional fitness is determined between the two.

Disease education . . . A third and rapidly expanding phase of the Magnolia medical department's battle against disease is its drive to show employes how to detect disease or signs of disease themselves.

This is done through lectures by the industrial nurse, movies, and educational booklets.

The department tackles one disease at a time. The first such program, started 20 months ago, was aimed at cancer and is being carried out in cooperation with the American Cancer Society.

The first phase of it concentrated on helping Magnolia's female employes detect breast cancer in its earliest stages. Since this program was initiated, six Magnolia women have discovered cancers on their own and have been sent to surgery. The department has found 11 others on examinations.

The second phase, aimed at early detection of prostate malignancies in men, will soon be under way. Similair programs to help employes detect cancers of the throat, lungs, bowels, etc., will be launched in the future.

Preparation for retirement . . . Magnolia's interest in the health and well-being of an employe doesn't end when he retires.

"Retirement at 65," Dr. Potts says, "leaves the average man vigorous and with a good life expectancy which continues to get longer. Retirement at such an age generally means security without necessity of working . . . which is what the employe strives for practically all of his life.

Magnolia's medical department has attacked this problem in somewhat the same manner as its disease-education program for active employes — with group lectures, movies, and educational pamphlets.

There is one major difference. The department feels that retirement is a different problem for each employe and that individual interviews and talks are essential.

The doctor discusses the employe's interests with him. In many cases, he suggests that the employe develop into full-time activity an interest which he before could develop only as a hobby because he had no time for it.

He may be encouraged to start a small business if he can afford it, or to do lots of fishing, or to use his technical knowledge in a consulting capacity, or any number of other things.

The important thing, the medical department thinks, is to encourage him to do something.

Texans Form Firm

Cullen heads company with domestic, foreign holdings

SAN ANTONIO, Tex.—Cullen Minerals Corp. has begun operations by purchasing oil, gas, and uranium properties in this country and abroad.

President of the newly formed company is Lucien Hugh Cullen, nephew of Hugh Roy Cullen, Houston oil man. The founders are Texas industrialists, investment bankers, and oil operators.

Cullen said C.M.C. has acquired rights to explore 90,000 acres in Cuba. The concession is in Pinar Del Rio Province, which has no oil production. The company plans to exercise an option on a half interest in an additional 200,000 acres.

C.M.C. said it is considering farmout agreements to fulfill drilling obligations of at least 3,000 ft. of hole within 6 months on the 90,000-acre concession. Oil rights were acquired from Arturo Gonzales, Del Rio, Tex., attorney who is a director of the new company.

Cullen Minerals has purchased 2,435 acres of oil and gas properties in Zapata County, Texas. It has an option to buy the working interests of the Miller and Pierce partnership in two shallow producing oil properties in Zapata and Webb counties in Texas. There are 38 producing wells on the acreage, with room for further development.

The new firm got into the uranium business through an agreement to operate Terminal Oil Co.'s producing mine at Blue Mesa, Colo.

Joe R. Abercrombie, Houston, will direct oil and gas field operations. He is a director and vice president of Cullen Minerals.

A two-man team, K. Douglas Kaasch and Ralph H. Wilpoit, will direct geological exploration and research. Kaasch is a geologist and mining engineer, formerly with Climax Molybdenum Co. Wilpoit, a geologist, has been deputy director of explorations for the Atomic Energy Commission at Grand Junction, Colo.

Long Line Being Dug Up

FORT LARAMIE, Wyo.—O. R. Burden Construction Corp. is taking up and reconditioning 944 miles of pipe acquired from Service Pipe Line Co.

This pipe is in what is known as the old Fort Laramie line of 6, 8, 10, 12, and 16-in. diameter. Last year this old line was supplanted by the 630-mile crude-oil line of 20, 22, and 24-in. diameter built by Service Pipe Line Co. under the name of an affiliate, Western Pipe Line Co.

The new 630-mile big-inch is now operated in the name of Service Pipe Line Co. It runs from Fort Laramie, Wyo., to Freeman, Mo. O. R. Burden was one of the contractors engaged in laying the big-inch pipe last year.

Burden has two spreads for taking up the old line, most of which is in Nebraska and Kansas. Reconditioning yards have been set up at Perry and Beloit, Kans. Preparations are being made for setting up two more yards at Humboldt, Kans., and Keystone, Neb.

Ohio May Acquire Small Firm

DENVER.—Kinney-Coastal Oil Co., Denver, has called a special stockholders' meeting to be held in Portland, Me., November 7 to ratify an agreement to transfer the firm's assets to Ohio Oil Co.

Under the agreement, Kinney-Coastal would transfer to Ohio Oil all its oil and gas properties, royalty interests, and other assets in exchange for newly-issued shares of Ohio Oil common stock. For each 17.5 shares of common capital stock in Kinney-Coastal, the holder would receive one share of the new Ohio Oil stock.

Kinney-Coastal's holdings include a half interest in Wyoming's Garland field. Ohio owns the other half and is acting as operator. Coastal also holds interests in Grass Creek, Salt Creek, and Pilot Bluff fields in Wyoming, and in Cheyenne County, Nebraska. Its current net production is approximately 2,200 bbl. daily.

Value of net current assets and property of Kinney-Coastal is $5,574,651. Net assets of Ohio Oil are $294,403,027. There are 3,629,595 outstanding shares of Kinney-Coastal.

Sinclair Fire Hurts 18

MARCUS HOOK.—Operations at the Marcus Hook plant of Sinclair Refining Co. were back to normal last week a few days after a flash fire in the receiving house. The blaze injured 18 employes, six critically. Property damage was negligible.

Plant officials gave this sequence of events: At 4 p.m. a leak developed in the rundown line from the crude units to the receiving house. Flow from the crude units was halted immediately. But gas spread to the receiving house basement and was ignited from an unknown source.

The flames burned management maintenance and operating personnel working to repair the leak. The fire was controlled in 45 minutes. The refinery was not shut down and operations were brought back to normal in only a few days.

On the boards in Japan . . .

. . . New Tankers World's Biggest

NEW YORK.—Two tankers that dwarf anything now afloat will be built in Japan for an American-controlled firm. They will be delivered some time in 1957 to Universe Tank Ships, a Liberian flag company.

The tankers each will be rated at more than 80,000 tons. They will be built in Kure Shipyards, Inc. The shipbuilding firm is operated by National Bulk Carriers, Inc., of New York. It has operated the former imperial naval arsenal at Kure under lease since 1952. The same company also owns Universe Tank Ships.

The two mammoth tankers are nearly twice the size in deadweight tons as today's supertankers. The world's biggest tanker is the 45,509-ton World Glory. The World Glory is the largest cargo ship ever built in America. It was made in the Quincy Yard of Bethlehem Steel Co., Shipbuilding Division, for Stavros S. Niarchos, independent tanker fleet owner. The World Glory is on Middle East duty for Gulf Oil Corp.

The two tankers will come from the same shipyards as the world's largest battleship, the 72,900-ton Yamato. That warship was sunk by U. S. planes late in World War II.

Original plans called for ships of 83,900 tons each, 815 ft. long and 125 ft. in beam. But the two vessels are being modified before plans actually leave the drawing boards. Elmer Hann, American manager of the shipyard, said last week in Japan the two still will be the largest cargo vessels in the world.

In comparison, the Queen Elizabeth is 83,673 tons, 1,031 ft. long, and 118 ft. in the beam. The Queen Mary is 81,237 tons, 1,020 ft. long, and 118 ft. in the beam. The two tankers will not be as long as the 990-ft. United States, largest American passenger liner. But they easily will top the vessel's 53,329 tons and 101-ft. beam.

The two tankers will be used to transport Persian Gulf crude to the United States, according to company officials. They will be powered by geared turbines and will have a cruising speed of 14 knots.

Railroad Commission head says . . .

Ratable Gas Take Coming

DALLAS. — Ratable gas take and posted field prices for gas definitely will be achieved in Texas.

This was the prediction last week of William J. Murray, Jr., chairman of the Texas Railroad Commission. Murray was speaking before the Petroleum Engineers Club of Dallas.

By ratable take for gas, Murray said he means not only proportionate production among wells in a field, but among various fields as well.

He warned, however, that these things would not come overnight or in the immediate future. The complicated nature of natural-gas marketing makes it impossible at present to simply issue an order which would bring about statewide ratable take, he said.

Murray cited two current characteristics of the gas buying and selling business as principal roadblocks. These are:

. . . **Varying prices** paid by pipelines for similar gas within the same field. This makes it difficult for the lines to interchange gas.

. . . **The conflict** between the gas-sales contract and the field-proration formula. The contract negotiated by the pipeline and the producer is based on reserves while the field-allocation formula is usually based on wells, surface acreage, acre-feet of pay, or any combination of these. Thus, the volume of gas which the pipeline is required to take by its contract seldom coincides with the volume required by the allocation formula.

The Railroad Commission, Murray said, is feeling its way along and proceeding a step at a time to try to solve these headaches and gradually achieve ratable gas take.

Its first major step was taken in Henze field with the elimination of producer nominations as the basis for setting field allowables *(The Oil and Gas Journal, September 5, page 68)*. The field allowable there will be whatever volume of gas the pipeline buyer wants to take (up to field MER) to fill his demand. This demand is distributed among wells in the field according to a commission-devised percentage factor based on the field allocation formula.

The commission feels this new system will iron out proration troubles in a field served by a single pipeline. It is casting around for other fields where it may be applied to straighten out such troubles. One of these is Puckett field of Pecos County, West Texas. Initial hearings already have been held on the Puckett situation.

Carthage problem . . . A much more formidable problem is the larger gas fields where there are a large number of pipeline buyers, fluctuating seasonal demand, and many prices paid for gas of similar quality.

Such a field is East Texas' sprawling Carthage field. The commission now is pondering what might be done here to see that gas is produced equitably. Hearings held in September are scheduled to resume about the first of the year.

No hint as to commission action in this respect was given by Murray.

Some think it likely that any new order on Carthage will provide that any pipeline connected to wells with underproduction it can't take must allow any other purchaser in the field to buy the gas until the underproduction is made up.

California Oil Output Down

LOS ANGELES.—After a steady rise the past several months, California crude production took a 7,000 bbl. a day dip in September.

Bulk of the reduction could be attributed to declines in the San Joaquin Valley and Los Angeles Basin fields. Top loser in the valley was Elk Hills, which dipped 1,800 bbl. daily. Other major losers in San Joaquin Valley were Guijarral Hills, which declined 1,600 bbl. daily, and Midway-Sunset, which dropped 1,000 bbl. a day.

The 3,700 bbl. a day drop in the Los Angeles region was topped by the 1,500 bbl. a day decline in Huntington Beach. Long Beach fell off 1,000 bbl. a day, and Wilmington showed a loss of 600 bbl. daily.

The biggest increase registered by any field in the state was the 1,200 bbl. a day upswing in the Ventura Avenue field.

T.G.T. Gets Texas Tax Rebate

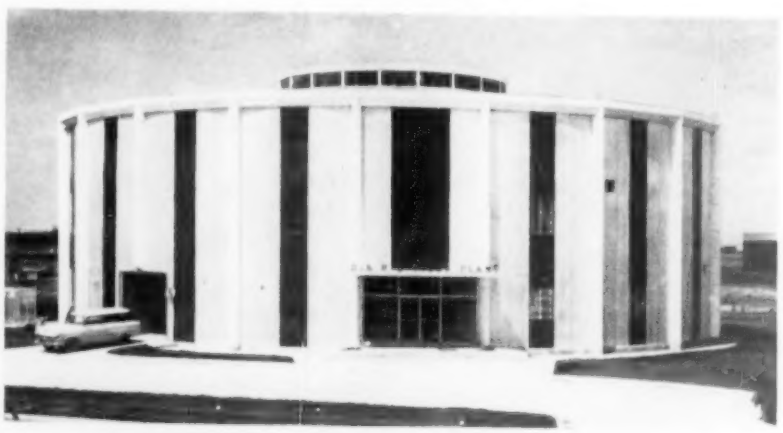
AUSTIN. — Tennessee Gas Transmission Co. made $1,140,906 in court here October 10.

District Judge Jack Roberts ruled in favor of the company in its effort to recover taxes paid under Texas' natural-gas gathering tax, which was invalidated by the U. S. Supreme Court in February 1954.

The state collected about $30,000,000 before the tax was ruled unconstitional. The T.G.T. payments were a portion of $6,000,000 in payments under the tax which were not paid under protest by the companies. The state had maintained that companies not protesting could not recover their payments.

Judge Roberts ruled that Tennessee paid the tax involuntarily, even though it didn't make formal protest, and was entitled to recover.

The decision in the T.G.T. suit opens the door for other nonprotesting firms to collect. The largest tax payer in this group was El Paso Natural Gas Co., which paid in more than $2,000,000. The state is expected to appeal Roberts' decision. It has already spent the funds in question.



New Dress Turns Tank Into Fancy Lab

Technicians of Continental Oil Co. at Ponca City, Okla., have turned an 80,000-bbl. oil-storage tank into an attractive research pilot plant. They dismantled and then reassembled the tank. Then they faced it with corrugated aluminum and porcelain enamel. The interior was fitted out for a 3-story research building serving 60 workers. The scientists will work on petrochemical processes and drilling, exploring, and production techniques.

Deeper Flood Ready

Gulf plans new Goldsmith water-injection project

ODESSA, Tex.—Gulf Oil Corp. has completed plans for a pilot water flood which could grow into another whopper in the prolific Goldsmith producing area of Ector County, West Texas.

Gulf already operates a huge water and gas injection program in the 4,200-ft. San Andres dolomite underlying 18,400 acres of Goldsmith's south dome *(The Oil and Gas Journal, December 6, 1954, page 86)*.

The company soon will launch a test water-injection program in the deeper Upper Clearfork formation of the Permian. The work will involve 462 acres of its C. A. Goldsmith et al lease in the field.

Productive acreage of the entire reservoir is estimated at 29,600 acres. It is located partly on the north-south trending Goldsmith anticline and partly on the southern portion of the north-south trending TXL anticline. The two anticlines are connected on the south by a productive saddle area.

The Upper Clearfork is topped at about 5,375 ft. and averages 355 ft. thick. The pay was discovered July 9, 1946, and is in the intermediate stage of depletion. There are currently 20 wells in the project area producing an average of 40 bbl. per well daily. Cumulative production is 1,553,272 bbl.

Gulf plans to convert six producing wells to water-injection service. Each will inject about 2,000 bbl. of water daily if such a volume doesn't require pressures in excess of the formation parting pressure.

Water would come from the Hendrick reef, presumably through the 30-mile, 18-in. water line from Hendrick field near Wink in Winkler County which Gulf laid last year to supply water for the San Andres flood.

Gulf is joined in the Goldsmith-San Andres Unit by Pure Oil Co. and Phillips Petroleum Co.

New Firm Formed by Texans

MIDLAND, Tex.—H. L. Brinson, Midland, and Carr P. Collins, Dallas, have formed Brinson-Collins Oil Co. here to operate oil properties acquired via their recent joint purchase of Dahm Oil Corp., Dallas.

The properties include 40 West Texas wells producing 475 bbl. of oil daily, 40 proved but undrilled locations, and other acreage. The wells are in Andrews, Dawson, Mitchell, and Howard counties.

The new company is planning to absorb the Brinson-Woodall operations of New Mexico.

Brinson and Collins also are principal owners of Milestone Drilling Co. of Midland. They plan to carry on drilling and production activities of that concern in conjunction with those of the new company.

Automatic Unifiner

Rock Island has first unit controlled by electronics

INDIANAPOLIS.—Rock Island Refining Corp. has completed the world's first Unifiner to be fully controlled by electronic instruments. The new hydrogen-treating unit is being operated in close conjunction with a Platformer. It is also electronically controlled.

Visbreaker gasoline from a Mid-Continent-Illinois crude mixture is being upgraded in the new 300-bbl. per day Unifiner. It actually is a feed preparation for the 2,400-bbl. per day Platformer.

This direct tie-in has a number of unusual features. Output of the Unifiner is charged directly to the Platformer feed-preparation tower. In the Unifiner a light treated gasoline is produced overhead for direct blending to finished gasoline. The tower bottoms, a heavy naphtha, are fed directly to the Platformer.

Hydrogen requirements of the Unifiner are supplied directly from the Platformer without compression. The two units are closely integrated for higher heat economy. Heat required to initiate the hydrogen-treating operation is supplied by exchange of Unifiner feed with Unifiner and Platformer effluents.

Universal Oil Products Co. licensed the Unifiner, engineered the electronic instrumentation, and did the design and process engineering on the unit. Actual construction was done by Rock Island personnel. The company said the Unifiner will raise the refinery's pool octane number substantially.

West Texas Leasing Slated

AUSTIN.—Oil and gas leases on 38,200 acres of University of Texas lands will be auctioned off November 29.

Four blocks requiring drilling within 6 months are among the 142 West Texas tracts up for lease. The restricted blocks, their acreage and depth requirements are:

Tract 57, Reagan County, 2,617 acres, 9,300 ft. to the Devonian.

Tract 71, Reagan County, 1,383 acres, 3,000 ft. to the San Andres.

Tract 128, Crockett County, 1,696 acres, 7,000 ft. to the Ellenburger.

Tract 132, Pecos County, 2,639 acres, 7,000 ft. to the Ellenburger.

Other tracts ranging from 80 to 660 acres will be offered in Andrews, Martin, Crane, Upton, Reagan, Crockett, Pecos, Ward, and Cooke counties.

Court Avoids Tidelands Stand

Government request for 3-mile offshore boundary denied; U. S. is now expected to sue Louisiana in lower court

WASHINGTON.—The Supreme Court refused last week to make an off-hand decision fixing Louisiana's gulf boundary at 3 miles.

The court denied a Justice Department petition to settle the issue by altering the decree in the original tidelands case. That decision gave the federal Government paramount rights to all oil and other resources beyond the low-water mark of the coastal states.

The court ruling was nullified by the 1953 Tidelands Act. In it Congress recognized right of the states to all submerged lands and resources out to their "historic" boundaries.

The Justice Department told the court the United States historically has not recognized any boundary claims beyond the 3-mile limit. Louisiana contended its 3-league boundary was recognized by the Government when the it came into the Union. The state argued the full court should decide the issue.

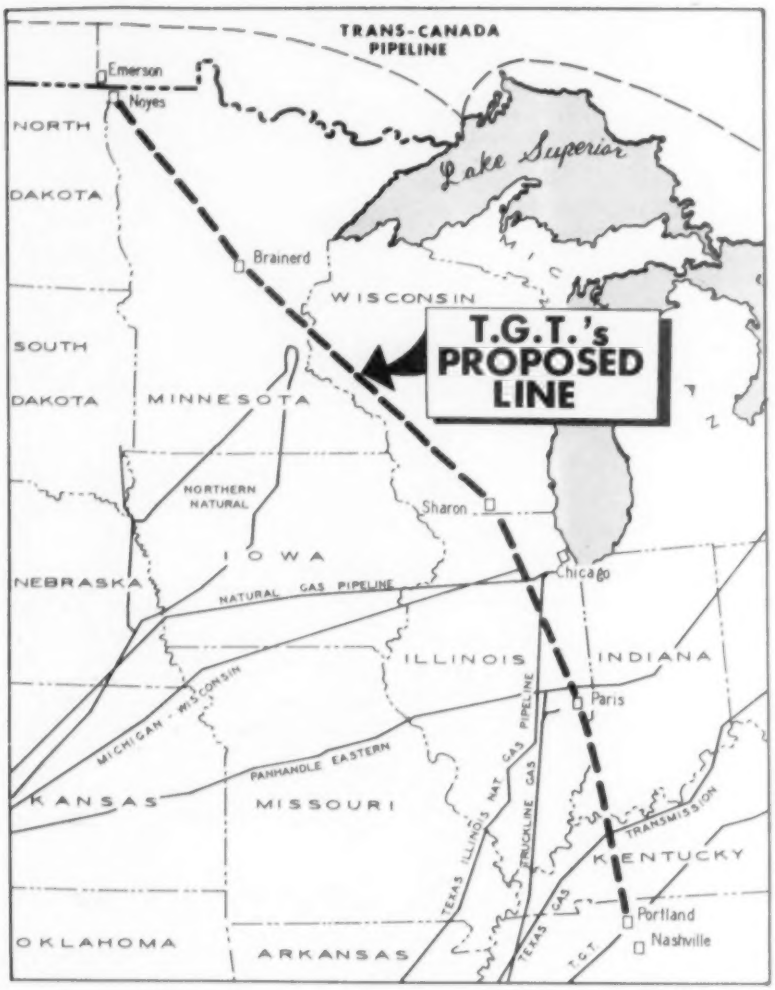
The court rejected the petition and didn't explain any reasons for its action. It left two points undecided. One: Louisiana's boundary. The other: What steps, if any, will be taken to make decisions in the tidelands cases conform with the 1953 Tidelands Act.

Test case . . . The Louisiana case has been watched as the test of title to oil and gas resources lying between 3 miles and 3 leagues off the Gulf Coast. Department officials have said they planned, if successful in the case of Louisiana, to test the 3-league claims of Texas and Florida.

Despite its setback in the Supreme Court, the federal Government is still free to file a new suit against Louisiana. This probably will be done. And eventually the issue again will come before the court for final action.

Key to Trans-Canada Handed FPC

- **T.G.T. asks approval of 1,112-mile Nashville to Manitoba natural-gas line**
- **Controversial project could pave way for starting huge Trans-Canada line**



WASHINGTON.—The key to starting the long-awaited Trans-Canada Pipeline is in the hands of the Federal Power Commission.

Tennessee Gas Transmission Co. last week asked FPC authority to build a 1,112-mile pipeline from Manitoba to Nashville. A new associated T.G.T. firm, Midwestern Gas Transmission Co., would import 200,000,000 cu. ft. of gas daily from Canada for sale to Midwestern cities along the route.

T.G.T. has already signed a contract to purchase the gas from Trans-Canada Pipe Lines, Ltd., at Emerson, Man. *(The Oil and Gas Journal, August 22, page 104).*

Approval of the scheme would break the ice for the 2,200-mile Trans-Canada line from Alberta gas fields to Montreal that has been on the drawing boards 5 years. The assured market would enable Trans-Canada to line up financing and start the Alberta-Emerson leg.

Optimistic Tennessee Gas officials predicted early approval for their proposed $98,000,000 line. A company statement said:

"Construction would start at once after FPC authorization, with completion and start of service estimated at November 1, 1956."

Battle in prospect . . . T.G.T. will stir up a hornet's nest of opposition in its bid to invade the market areas of several major transmission companies whose lines it would cross (see map).

T.G.T. seeks permission to serve what it terms "long-neglected" natural-gas markets in Minnesota, Wisconsin, Illinois, Indiana, Kentucky, and Tennessee. The company claims the big marketers there have fallen down on the job and that public officials and local gas industry leaders have tried in vain to get increased service.

These contentions are sure to be challenged before the FPC. The battle could rage well into 1956, scuttling early construction plans for the Midwestern line and Trans-Canada.

Montana-Dakota Utilities Co. will also enter the battle, seeking to prevent Midwestern from serving Fargo and Grand Forks, largest cities in North Dakota. Montana-Dakota wants to build a line to serve these cities and others across the state as soon as it ascertains sufficient North Dakota gas is available.

Anson Anderson, member of the North Dakota Public Service Commission, said if Midwestern gets those two markets on the North Dakota-Minnesota border, the east-central section of his state may never be served with natural gas. He said it would be uneconomical to move gas either east or west.

The Midwestern line would be 24-in. at either end with 12-in. and 16-in. segments in the middle.

Delivery capacity would be 400,000,000 cu. ft. daily. Besides the imported gas, T.G.T. would tap Gulf Coast supplies for an additional 200,000,000 cu. ft. daily for delivery to Midwestern north of Nashville. That is the connecting point with T.G.T.'s huge Gulf Coast-New England system.

T.G.T.'s contract with Trans-Canada also calls for purchase of another 200,000,000 cu. ft. of gas daily when and if available. Price of the Canadian gas has not been disclosed.

The company filed three applications with FPC. They propose:

. . . To deliver to Trans-Canada at the international boundary near Niagara Falls up to 86,755,000 cu. ft. of natural gas daily. The deal would be for a short term only. The purpose: to serve and develop markets in the area between Toronto and Montreal pending completion of Trans-Canada's all-Canadian pipeline.

Trans-Canada already is serving Toronto with a line from Niagara Falls. It has Canadian Government permission to extend the pipeline to Mon-

treal. Financing and markets are all arranged.

. . . To build facilities costing $18,600,000 to permit delivery of the 200,000,000 cu. ft. daily to Midwestern. They would include 100 miles of gathering lines in Texas and Louisiana, five new compressor stations in Texas, Louisiana, Mississippi and Tennessee, and additions to four existing stations.

. . . To expand its trunk system by 162 miles. The $24,300,000 project includes paralleling part of the present system through Kentucky, Ohio, and Pennsylvania. Two new compressor stations would be built in Tennessee and Massachusetts, and four others enlarged. These facilities would permit increased delivery of 108,978,000 cu. ft. daily to existing customers next winter.

If approved, the various projects would expand Tennessee Gas Transmission's pipeline capacity to 2,000,000,000 cu. ft. daily. Peak load would be 2,500,000,000 cu. ft. daily.

The new Midwestern company is headed by Gardiner Symonds, T.G.T. president, as chairman. N. W. Freeman, senior vice president of T.G.T., is president.

Complications ahead . . . If FPC approval is delayed more than a few weeks, the problem of getting big-inch pipe and the short construction season could play havoc with completion schedules of Midwestern and Trans-Canada.

The Trans-Canada proposal has languished for years because of obstacles to raising the $350,000,000 construction cost. But the right formula may have been found now. Canadian Government officials are talking of completing the Alberta gathering system and the trunk line to Winnipeg and Emerson by October 1956. They set the same goal for Toronto-Montreal.

Target for the major stumbling block—the $120,000,000 Ontario leg—is completion by late 1957 *(The Oil and Gas Journal, September 12, page 97)*.

The Ontario section, which traverses a vast area with little potential market, would be built by a crown company and leased and operated by Trans-Canada. The section would be financed by the federal and Ontario governments.

Prime Minister St. Laurent said the federal and provincial governments had agreed verbally to finance the 675-mile northern Ontario link, if Trans-Canada can build the major portion of the line. It has until April 30 to prove financial ability.

Ontario Premier Frost said the project now depends almost entirely on FPC approval to import Alberta natural gas.

California Rig Makes Quick Move

Crews of Shell Oil Co. moved heavy Rig 7 in 29 truckloads from a site in the Ventura field in southern California to the company's Posuncula lease in San Joaquin Valley. The 150 tons of equipment, shown being loaded above, was moved the 120 miles in just 3 days. The rig was completely set up and ready to spud in within a week from start of the move. It marked Shell's return to San Joaquin Valley with a company rig after an absence of 6 years.

Atom May Be Partner of Oil

BALTIMORE. — Atomic energy will become both a competitor and a partner of the oil business in the years to come.

While it will undoubtedly cut into sales of heavy fuel oil and diesel fuels, it will probably open up new markets by improving the standard of living of vast numbers of the world's population.

These probable effects on oil demand were outlined here last week by Albert J. McIntosh, chief economist of Socony Mobil Oil Co., Inc., at an Oil Progress Week luncheon. McIntosh undertook to project petroleum demand not only for the United States but the world, including countries behind the Iron Curtain.

In addition to the nuclear-powered electrical plants now under way, plans are in the mill for atomic-powered aircraft, liners, cargo boats, and locomotives. While these will come, a great many years will pass before they are produced in large numbers. Long-range forecasts of petroleum demand must take them into consideration, however.

The following table includes some of these qualifying points. McIntosh notes that his estimated U. S. demand in 1975 is somewhat lower than that reported by the Pauley Commission, with the large differences occurring in projected heavy fuel or industrial-fuel demands. He expects automotive fuels, lubricants, asphalts, and petrochemicals to remain in firm demand, while home-heating oils and process oils used by industry may feel some effect down the road in the more distant future. By the year 2000 he quoted an Atomic Energy Commission consultant's estimate that about one-quarter of the world's total energy will be supplied from atomic sources. This is a reasonable figure, said McIntosh.

PETROLEUM DEMAND
(Thousands of barrels daily)

Year	Domestic	World
1955	8,300	15,800
1956	8,650	16,700
1960	9,700	20,000
1965	10,700	24,000
1975	12,200	30,000
2000	15,300	40-45,000

Looping Project Under Way

LOS ANGELES.—Work has started on a $2,500,000 project to loop a 31.5-mile segment of Southern Counties Gas Co.'s 30-in. transmission line in Riverside County. Engineers, Ltd., Pipeline Co., contractors on the project, expect to complete work in mid-November.

When this final segment is finished, it will complete looping the entire 210-mile line from the Colorado River to Los Angeles owned jointly by Southern Counties and Southern California Gas Co. The artery joins El Paso Natural Gas Co.'s 30-in. line near Blythe, Calif.

New pozzolan mix developed . . .

. . . Deep Well Cement Costs Cut

DUNCAN, Okla.—A new cement designed for deep, high-temperature wells has been developed by Halliburton Oil Well Cementing Co. It is a pozzolanic cement, called Pozmix 140.

Announced by Halliburton's D. K. Smith at the New Orleans A.I.M.E. meeting, the new material has already been field tested. Not only did it work well in every case; it also proved cheaper than older cements.

Pozmix can be used at depths of 6,000 to 18,000 ft. or more where temperatures are like those in Gulf Coast fields.

Stable in the well . . . Pozmix 140 is composed of a pozzolanic material, hydrated lime, and a chemical activator to give it early initial strength. When set, it resists attack by sulfate waters and brine and does not leach.

A permanent cement job should result, regardless of well fluid types.

Halliburton does not now recommend the cement at temperatures less than 140°. But where temperatures are 140° F. and higher, its compressive strengths in 24 hours are more than adequate.

The strengths are higher than many other types now in common field use. And the mixture does not lose strength at high temperatures as do some other types of cement.

Slurry weights run from 13.5 to 14.3 lb. per gallon according to specific gravity and water requirements of the pozzolan itself. The slurry can either be accelerated or retarded across a wide range of well conditions.

Field experience . . . One major operator reports using Pozmix 140 in five wells in the Lindsay, Okla., area. Depths ranged from 8,650 to 13,000 ft. Temperatures were 150° to 205° F.

In one well, two zones only 107 ft. apart were tested and fractured with 5,000 psi. fracturing pressure. There was no breakdown of the cement and no communication of the zones. There was nothing abnormal in the cementing job. Displacement pressures were about the same as jobs with conventional materials.

Another operator reports four trouble-free jobs in the same area.

In South Louisiana, an operator used Pozmix 140 in a 9,100-ft. well to cement 7-in. casing in a 9⅞-in. hole. Bottom-hole temperature was 176° F. Pipe was run to bottom, raised 1 ft. and the hole circulated 2 hours.

When cement was displaced, pump pressure was lower than with commonly used materials. This operator reports that slurry weight was less and cement cost was down 20 per cent. There was no difference in rig time.

Long Beach Leasing Delayed

SACRAMENTO.—Action was postponed on Apex Petroleum Corp.'s request to put up for bonus bidding an 800-acre tidelands parcel off Long Beach. The State Lands Commission decided to hold up action on the proposal following a hearing held here last Monday.

Opposition to the request developed when the city of Long Beach claimed the state lacked the authority to grant mineral development rights on the parcel even though it is part of the state park system.

The lease involved is on the southern border of the city and is adjacent to the Monterey Oil Co.-The Texas Co. offshore drilling island on their Seal Beach lease.

Offshore Lease Put to Vote

REDONDO BEACH, Calif.—Redondo Beach voters will decide November 15 whether their city should grant a drilling lease on its tidelands to three oil companies.

Last April 4, the City Council voted to accept the $200,000 bonus offer of Signal Oil & Gas Co., Reserve Oil & Gas Co., and Artnell Oil & Gas Co. But because a city ordinance bans shoreline drilling, the November 15 election is necessary. The deal the three companies offered the city, in addition to the bonus, included a royalty scale ranging from 18 to 60 per cent on crude produced, depending on production rate.

The proposed pact calls for all exploratory drilling to be done from an offshore island located at least ¾-mile seaward. Because of the terms under which Redondo Beach was granted its tidelands by the state, no questions of ownership are expected to arise such as happened at Long Beach.

Court Gets Depletion Tiff

WASHINGTON.—A lower court conflict over depletion will shortly be thrashed out in the Supreme Court.

The court last week agreed to review two decisions on who gets the depletion allowance on California offshore oil drilled from upland sites.

In one case the Southwest Exploration Co. obtained a state lease off Huntington Beach. The company agreed to pay the owners of upland property from and through which the well was drilled a percentage of the profits. But the company balked at giving the property owners the depletion allowance. The other case was brought by the Huntington Beach Co., one of the upland owners.

The U. S. Court of Appeals held the producer had to give the upland owners the depletion on their share of the profits. The Court of Claims took the contrary view.

Drilling Barge Heads for First Location

This submersible drilling barge, recently completed by Levingston Shipbuilding Co. at Orange, Tex., is shown leaving for its first drilling assignment. Built for Penrod Drilling Co., Shreveport, the barge is 185 ft. long and 50 ft. wide. Three D-397 Caterpillar engines drive the EMSCO J-1400 power rig, which has a depth capacity estimated at 18,000 ft. The barge is equipped with a 145-ft. Lee C. Moore jack-knife derrick. It has air-conditioned living quarters for 21 men.

Way to High Octane

Blending of pure chemicals and TEL may achieve goal

LOS ANGELES.—The four basic types of chemicals found in gasoline stocks—olefins, paraffins, naphthenes, and aromatics—may hold the key to the use of 100-octane gasoline as a motor fuel.

Two research scientists of Ethyl Corp.'s Detroit laboratory told the California Natural Gasoline Association here last week that the 100-octane of the future would probably be made by blending these pure chemicals.

Association members heard F. W. Warren and F. D. Buerstetta report in a joint authorship paper that gasolines by 1960 or shortly thereafter would be selectively blended from the highest octane products obtainable by refining methods.

Studies made by Ethyl show that the best over-all antiknock performance can be had by blending a high proportion of aromatic stock with paraffinic stock and adding the maximum amount of tetraethyl lead.

High aromatic content gives the best low-speed antiknock resistance. In cases of high-speed knocking aromatic content is less important, but maximum TEL concentration is still required.

Where only olefinic and paraffinic stock is available, high paraffin stocks give the best over-all performance when the maximum amount of TEL is added.

The researchers pointed out that work now being done would be a valuable guide for the best blending of components when the 100-octane goal was actually reached.

Rubber Plant to Expand

HOUSTON.—Expansion of Goodyear Tire & Rubber Co.'s synthetic-rubber plant here is scheduled to start early in December.

B. A. Rosinski, plant manager, said engineering work is nearing completion and the company should be ready to invite bids within 2 or 3 weeks.

First phase of the project will cost approximately $6,000,000 and will increase the plant's output from the present 137,500 tons annually to about 170,000 tons. Initial expansion is scheduled to be completed early in 1957 *(The Oil and Gas Journal, August 29, page 64)*.

Long-range plans call for increasing production by 50 per cent in the next 5 years, according to E. J. Thomas, company president *(The Oil and Gas Journal, May 30, page 55)*.

The Houston plant is operated by Goodyear Synthetic Rubber Corp.

Kids Help in Oklahoma Celebration

The big role oil plays in the life of southern Oklahoma was dramatized at this year's Golden Trend Oil Show by the children of oil-company employes. The children were part of a parade opening the show, which is held at Pauls Valley, Okla. There were 585 grade school and junior-high school students in the parade. Each carried a sign that read "My Daddy Works for (name of company)." The show is an annual celebration of the southern Oklahoma producing area.

Industry Briefs

HOUSTON.—Producing Properties, Inc., has acquired half interest in 14 East Texas oil wells from F. Wilson Dye and Carl B. King, Dallas. A. Knox Tyson, president, said the purchase price was about $750,000. Tyson, a managing partner of Slick Oil Co., Ltd., formerly was president of American Republics Corp., which recently merged with Sinclair Oil Corp.

HOUSTON.—Bechtel Corp. has been awarded the contract for initial expansion of Petro-Tex Chemical Corp.'s butadiene plant here. This is the first step in a program which includes a $1,500,000 research laboratory and new facilities to increase the output within 5 years by at least 50 per cent *(The Oil and Gas Journal, May 30, page 55)*. Present capacity is 90,000 short tons a year.

DALLAS.—Magnolia Petroleum Co. has increased its posted price for Illinois basin crude from $2.90 to $3 per barrel. Magnolia is meeting a 10-cent increase initiated by Carter Oil Co. The Texas Co., Pure Oil Co., and Ohio Oil Co. also have met the increase.

CORPUS CHRISTI.—South Texas Oil & Gas Co. plans extensive oil exploration in the Williston basin and Rocky Mountains. The Corpus Christi firm has agreed to purchase the assets of North American Uranium & Oil Corp., including 35,000 acres of leases and claims in those areas. The purchase, to be made with South Texas stock, is subject to approval of North American stockholders. This would be the South Texas firm's first acquisition in the Williston basin.

WASHINGTON.—Wilcox Trend Gathering System, Inc., plans a $2,907,000 expansion of its natural-gas facilities to meet increased requirements of the affiliated Texas Eastern Transmission Corp. The project includes a 16-mile looping of its line to Provident City, Tex., using 16-in. pipe; 5.5 miles of 3-in. in Jennie Bell and Gohlke fields; addition of 2,200 hp. at its Thomaston, Tex., compressor station and a new 2,000-hp. station at Charco, Tex. The project is before the Federal Power Commission.

WASHINGTON.—The Armed Services Petroleum Purchasing Agency will open bids this month for approximately 11,720,000 bbl. of Navy special and 700,000 bbl. of No. 6 burner oil. Bids will be received through October 21 for the supply of 4,370,000 bbl. of Navy special and 600,000 bbl. of No. 6 on the West Coast and 7,350,000 bbl. of Navy special and 100,000 bbl. of No. 6 from East Coast, Gulf Coast, and Caribbean refineries.

GULF'S SPRAWLING Port Arthur, Tex., plant—where new refinery wage pattern may be set.

Union Tests Strength in Gulf Talks

- Port Arthur negotiations watched closely for possible industry-wide pattern; union ready to strike if necessary
- Double pay for overtime, triple pay for holidays top long list of unusual contract demands submitted by union

Joe Reilly

PORT ARTHUR, Tex.—The peaceful coexistence enjoyed at most refineries faces a severe test at Gulf Oil Corp.'s Port Arthur plant. Here negotiations may set the pattern for a new balance of power between labor and management.

The C.I.O. Oil, Chemical, and Atomic Workers Union has made unusually optimistic demands in current negotiations. The union's Local 23 represents 5,000 workers at Gulf's biggest refinery. Its membership also is the largest in the O.C.A.W. organization.

So far, negotiations have been on an amicable basis. But Local 23 is preparing for a possible walkout. Its 60-day strike notice required by federal law, expires October 17. Its 18-month contract with Gulf ends the same day. After that, the union will be free to strike any time it chooses to do so.

Advance notice of a possible strike, of course, is routine. But some of the proposals made by the union around the conference table in the past 60 days are not. They cover nearly 20 typewritten pages. Some of the more controversial include the following:

. . . **General wage** increase of 15 cents per hour.

. . . **Double pay** for all overtime.

. . . **Triple pay** for holidays.

. . . **Shift differentials** of 10 and 20 cents an hour (as compared to the present boost of 6 and 12 cents) for second and third shifts.

. . . **Three weeks' vacation** after 10 years of employment and 4 weeks' after 20 years. Workers now get 3 weeks after 15 years and 4 weeks after 25 years.

. . . **An extra holiday,** Christmas eve, making eight for the year.

. . . **Severance pay** ranging from 1 week's wage after 1 year on the job to 52 weeks' pay after 10 years.

. . . **Additional wage** increase of 4 cents per hour for all No. 1 machinists.

. . . **Still more pay adjustments** for certain job classifications.

. . . **Payment by the company** of all hospital and surgical insurance premiums. The company now pays up to $2.50 per month.

. . . **Compensation** by the company for time spent in negotiations.

. . . **Restrictions on work** within the plant which may be let to outside contractors.

. . . **Two paid "smoking periods"** per shift. The company also is asked to provide a place within the plant where employes may do their smoking.

. . . **Cafeteria** and soft-drink machines maintained in the plant by the company.

. . . **Full-time steward** for the day shift—a man who would draw regular pay but would be required to do no work directly for the company.

These demands, together with dozens more of varying significance, caused one Gulf official to remark: "They're asking for everything they ever thought of."

Company and labor representatives have held 10 conferences within the past 60 days to discuss the union's proposals. So far, the company has given no indication how far it may be willing to go or what counter-proposals it may make. Both labor and management spokesmen indicated last week, however, there is little danger

of an immediate strike at the 272,000-bbl. plant.

Meanwhile, other locals and other companies are watching developments with unusual interest. The word had been circulated in advance, either as a rumor or otherwise, that the union planned to make a test case here. It is generally agreed that any major gains for the union will be felt in contract talks at other refineries during the coming year.

Demands a surprise . . . E. R. McAdams, chairman of the negotiating committee for Gulf workers, emphasized there's "no animosity" between the union and company "at this time." He said the company hasn't replied to the union's proposal and added: "We have no way of knowing whether we're going to run into trouble."

Wage demands made by the Gulf group came as a surprise to many in the industry. Gulf, like most refiners, had granted a wage boost of 10 cents an hour effective last March.

The proposed wage increases also are outside the general pattern followed in most recent negotiations with refiners. Contract talks are under way in at least two other Gulf Coast refineries. But the Gulf group apparently is the only union seeking a general wage increase. Wages were only a minor issue in new contracts recently approved by Pure Oil Co. for its Nederland, Tex., plant and by Republic Oil Refining Co. in Texas City.

Racial issue hot . . . In one of its proposals, the union obviously wasn't sure of itself. That's on the question of racial discrimination.

In the past, the 800 or so Negro workers in the plant have been ineligible for most of the top jobs. Negroes generally are employed only in the "labor division." As a result, they were barred from jobs in the "operating-mechanical division," dominated by white workers.

A test case filed by Local 254, representing Negro employes, is now before the U. S. Supreme Court. Both the company and the local representing white workers are defendants. They were charged with discrimination against Negro employes by contractual agreements.

The union's international headquarters, also holding the agreement to be discriminatory, refused to ratify the last contract negotiated by Gulf and Local 23.

The case has gone through two federal courts — the district tribunal at Tyler, Tex., and the U. S. Circuit Court of Appeals at New Orleans. Both held in effect that the contract did not violate the federal law.

Neither the company nor the white men's local is content to stay only within the letter of the law in their pending contract. There's a very obvious reason. Government contracts now require the contractor to give equal opportunity regardless of race, religion, color, or national origin. Failure to comply could mean the loss of a Government contract. And practically all refineries in this country sell something to the Government at one time or another.

Members of the disputing locals met last week to work out a new agreement. The joint proposal, although not formally submitted to the company, will abolish some of the rigid standards for job qualifications. It reportedly would allow Negroes to compete for 50 per cent of any openings created by the company or resulting from an employe's leaving the company.

Settlement of this issue, too, will be watched closely by other companies and other locals, especially in the South.

Company Pays Union Steward, so . . .

. . . Republic Walkout Settled

TEXAS CITY.—Union employes are back at work at Republic Oil Refining Co.'s plant here. Their 2-month strike over who would pay the salary of a full-time steward was settled last week.

About 375 members of the C.I.O. Oil, Chemical, and Atomic Workers International Union returned to their jobs following the compromise on a new contract.

The union won a contract clause providing for the full-time union plant steward to be paid by the company. This arrangement is believed to be the first ever written into a contract covering refinery workers. It was one of the principal issues at stake in the strike *(The Oil and Gas Journal, August 29, page 61)*.

The policy of the steward receiving regular pay while performing only labor activities may be an issue in negotiations at other plants in the industry. Such practice had existed at the Texas City plant for some time. But it was not spelled out in the contract.

No general wage increase was provided by the Republic contract, nor was it a strike issue. Specific adjustments brought pay hikes ranging up to 3½ cents per hour for certain jobs. The company reported clauses also were written in the agreement giving it more control over distribution of overtime work and job staffing. The contract extends to April 1, 1957.

Some of the crude units at Republic's 42,000-bbl. refinery were being put on stream late last week. Plans call for revamping some other units. They are expected back in operation within 90 days.

Wage meeting called . . . Meanwhile, the O.C.A.W. moved to fashion a new industry-wide program for wage increases.

The international union's bargaining policy committee has been summoned for a meeting in Kansas City, Mo., November 12. The committee has authority to establish general collective bargaining policies for the union. Negotiations, however, usually are conducted separately at each plant.

In calling the Kansas City meeting, O. A. (Jack) Knight, O.C.A.W. president, followed suggestions of the nation-wide union council of The Texas Co. It had asked that a wage increase program be initiated. A "grass roots" campaign to obtain wage boosts for oil industry employes also was started in August by the Tulsa local.

Union Wildcat Spurs Leasing

SARATOGA, Calif.—Reports of an oil field discovery have touched off a leasing play in the Santa Cruz Mountains in San Mateo County.

Union's 1 Richfield-Union-Costa reportedly produced good shows of 41°-gravity crude from two formations around 2,000 ft. The wildcat was drilled to 3,804 ft. and plugged back to 2,754 ft.

The test is located 7 miles west of Saratoga. It is in an area previously explored without success by six other companies. The Texas Co. was the last to try. It drilled a 4,312-ft. dry hole about 3 miles west of Union's wildcat.

Ammonia Plant Announced

DENVER.—Umbaugh Chemicals, Inc., of Denver, has announced it will build an anhydrous-ammonia plant near Walsenburg, Colo., on 162 acres subleased from Cotarco, Inc.

The latter firm will build a coal-carbonization plant near Walsenburg from which Umbaugh plans to get its gas stream as a source of hydrogen. Umbaugh also plans to build phosphoric acid, phosphate, and ammonium sulfate plants near the ammonia units.

Nebraska Test Hits

Nearest producer in state is 100 miles to northwest

McCOOK, Neb.—Oil has been recovered at a rank wildcat 8 miles west of here in a sparsely tested region about 100 miles from closest Nebraska production.

The wildcat, Jones, Shelburne & Farmer 1 Fritz, is the first to be drilled in Hitchcock County. On drill-stem test at 3,872-96 ft., the operator reported a steady blow, recovering 125 ft. of gas, 50 ft. of free oil, and 75 ft. of muddy oil from the Pennsylvanian.

Nearest Nebraska production is about 100 miles to the northwest at Big Springs field in the Denver-Julesburg basin. Location of the test is near the Cambrian pinchout on the Cambridge arch in southwestern Nebraska. It is 50 miles northwest of the Norton, Kans., pool.

There has been considerable drilling in this general area of the state in recent months, most of it in Hayes, Red Willow, Phelps, and Buffalo counties. But the Hitchcock County prospect offers the first solid indication of production.

The promising wildcat stirred great interest in the area. One major company is reported to have leased 200,000 acres surrounding the well. The block covers most of Hitchcock County.

Confiscated Land Offered

WASHINGTON.—Oil and gas leases on four tracts of California land seized from enemy alien owners will be sold October 25 to the bidders of the highest cash bonuses by the Office of Alien Property of the Department of Justice.

The leases will cover the northeast one-quarter, the southeast one-quarter, and the southwest one-quarter of Section 33, Township 27 South, Range 20 East, and the west one-half of the west one-half of Section 32, Township 27 South, Range 20 East in Kern County.

GR-S Plant Offered

Government trying to sell last of rubber facilities

WASHINGTON.—Sale of the Government's largest synthetic rubber facility, the 122,000-ton GR-S plant at Institute, W. Va., is being negotiated by the rubber disposal commission.

Goodyear Synthetic Rubber Corp., which last spring purchased the 15,200-ton plant at Akron, Ohio, and the 99,600-ton plant at Houston, and Goodrich-Gulf Chemicals, Inc., which bought the 88,000-ton GR-S and the 190,000-ton butadiene plants at Port Neches, Tex., are among the six bidders for the plant.

Other bidders are Edwin W. Pauley, Los Angeles; Union Carbide & Carbon Corp., New York; Imperial Commodities Corp., New York; and Union Rubber & Chemical Co., a wholly owned subsidiary of United Carbon Co., Charleston, W. Va.

The commission has until December 21 to make a final contract of sale. It must be approved by the Attorney General from the standpoint of the antitrust laws. A report and recommendation must be filed with Congress within 10 days of the opening of the 1956 session, and Congress will have 30 days to review the sale. If neither house objects to the sale, the property will be transferred within the following 30 days, or about March 15.

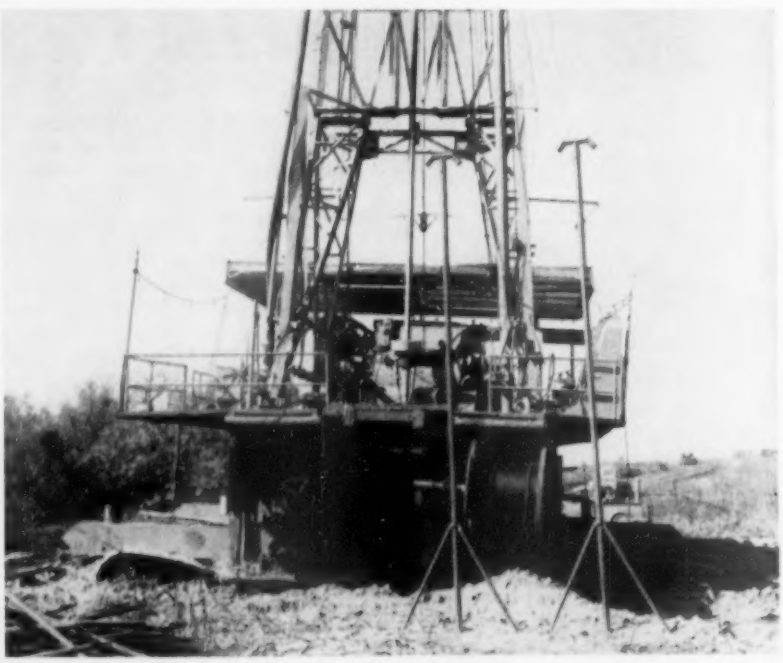
Last of its kind . . . The Institute plant is the last of the 27 facilities which comprised the Government's synthetic-rubber monopoly. Twenty-five other plants were sold last spring and an alcohol-butadiene plant at Louisville, Ky., was leased for 3 years. The Government has secured more than $318,000,000 from the sale of the plants and 447 tanks used in their operation.

Refineries Tackle Smog

LOS ANGELES.—Los Angeles area refineries have launched a voluntary plan to reduce smog-producing activities in the event of first and second-stage alerts.

The Western Oil and Gas Association program calls for more orderly measures than the "crash" plan which the Air Pollution Control District is empowered to invoke. At a first-stage alert the industry checks all control equipment, stops waste burning, and curtails auto driving by employes.

A second-stage alert halts tank cleaning and repairing, stops sampling, and stops loading at facilities without vapor-recovery systems.



Bogged-Down Rig Waiting on Sunshine

Too much rain in Garvin County, Oklahoma, resulted in this picture. Phillips Petroleum Co.'s Rig 29 was being skidded to a new location when the weight of the complete rig pushed the crawler-type rig-moving units almost out of sight in the mushy earth. The skidding operation was contracted to Ada Rig Co. (Journal field photo.)

A Saving Program...

for a Fuel Terminal

When crude oil or motor gasoline is stored, it is necessary to take steps to prevent evaporation losses. Horton® Floating Roofs, Double-Deck, Pontoon and Pan, are designed and built for installation in flat-bottom oil storage tanks to reduce evaporation loss, decrease corrosion and eliminate fire hazards.

Aviation Fuel Terminals, Inc., at Beaufort, N. C. has ten tanks, a total of 600,000 bbls. of tankage, all equipped with Horton Pontoon Floating Roofs. Thus equipped, a real vapor saving program is constantly in effect at this fuel terminal.

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Writeoffs Granted

ODM clearing backlog of oil industry projects

WASHINGTON.—Nearly a score of oil and gas industry requests for quick tax writeoffs on construction projects won approval by the Office of Defense Mobilization last week. The agency moved to clear the backlog of eligible applications under its new program *(The Oil and Gas Journal, October 10, page 133).*

The United Oceanic Corp. was granted quick writeoff on 35 per cent of a $66 million investment in ocean-going tankers. The certificate apparently will cover eight new vessels the company will build for long-term charter to the Military Sea Transportation Service.

Other applications were granted from 45 suspended cases revived when issuance of certificates was resumed this month. They included:

Refining—Utah Oil Refining Co., Salt Lake City, 40 per cent of $441,000 and 65 per cent of $2,097,500 for new facilities; Petrolite Corp., El Paso, Tex., 65 per cent of $21,800; Carter Oil Co., Billings, Mont., 54 per cent of $412,-750 and 65 per cent on $1,384,250.

Natural gas—Sunray Mid-Continent Oil Co., Acadia Parish, Louisiana, 40 per cent on $163,000 and 65 per cent on $1,181,000; Sunray Mid-Continent Oil Co., San Patricio County, Texas, 25 per cent on $269,000 and 65 per cent on $3,241,000.

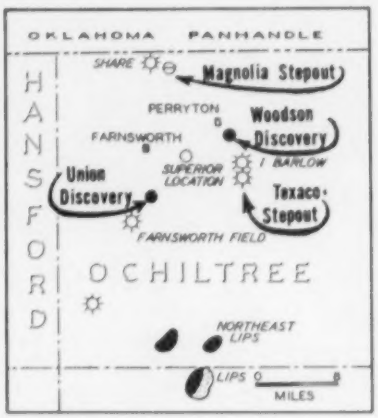
Pipelines—Keystone Pipe Line Co., Swarthmore, Pa., 25 per cent on $153,-400; Aurora Gasoline Co., Detroit, 25 per cent on $516,183 and 40 per cent on $290,000; Buckeye Pipeline Co., 25 per cent on $1,153,600; Shenandoah Gas Co., 25 per cent on $960,000 for transmission lines; Panhandle Eastern Pipe Line Co., 25 per cent on $5,060,-540 for gas pipeline; Esso Standard Oil Co., 40 per cent on $979,500 for underground gas storage at Sorrento, La.

Tank cars—Union Tank Car Co., Chicago, 85 per cent on $4,433,000.

Pilot Water Flood Approved

AUSTIN. — The Texas Railroad Commission has approved a proposed pilot water flood in Sayles field, Jones County, West Central Texas. It is expected to recover an additional 500,000 to 1,500,000 bbl. of oil from the field's Flippen sand pay.

The flood initially will affect 600 of the reservoir's 720 acres. It will be conducted by The Texas Co. and General American Oil Co. of Texas. Six producers will be converted to water-inputs on a 5-spot, 10-acre pattern. Salt water from the 1,500-ft. Sedwick lime will be injected through a closed-type system at a 1,000-bbl.-per-day rate.



Ochiltree Hot Spot

Discoveries spark interest in Texas Panhandle county

PERRYTON, Tex. — Current oil-gas discoveries and indicated strikes have turned Ochiltree County into the hottest drilling spot in the Texas Panhandle this year.

Ochiltree is located just east of prolific Hansford County in the northern tip of the Panhandle. It now has two new oil fields in the making and two new gas reservoirs.

Woodson Oil Co. has a good oil discovery at 1 Perry Unit "A," about 1½ miles southeast of Perryton. It flowed at the rate of 56 bbl. hourly from the Morrow-Pennsylvanian sand at 7,470-7,505 ft. The well could be the forerunner of a major oil pool for this sparsely productive area.

Another discovery is swabbing oil from the Pennsylvanian at 7,958-66 ft. It is Union Oil Co. of California's 1 Russell, 5 miles south of Farnsworth and 2½ miles northeast of the Farnsworth gas field, a Morrow sand producer. Operator reportedly swabbed 132 bbl. of oil on one test.

The Texas Co. has completed a gas producer at 1 Cutter "A." The Morrow sand well produced 28,000 M.c.f. of gas daily and 5 bbl. distillate per million cubic feet of gas. Location is 1 mile south of Texaco's 1 Barlow, a gas discovery.

Magnolia Petroleum Co. is looking for Morrow gas production at its 1 George-Mounts well. It is located ½ mile northeast of the firm's Fulton 1-54 Share, a shut-in Morrow gas discovery, 8 miles northwest of Perryton.

Superior Oil Co. has made location for its 1 Oringderff 5 miles southwest of Perryton and 8 miles northeast of the Farnsworth pool.

W.P.R.A. Dual Session Set

EL DORADO, Ark.—Approximately 135 refiners are expected to attend the regional technical-industrial relations meeting of Western Petroleum Refiners Association at El Dorado, Ark., October 20 and 21.

John L. Wylie, director of industrial relations of Pan-Am Southern Corp., El Dorado, will preside at the industrial relations session on Thursday. Harry K. Wheeler, Pan-Am Southern, will serve as moderator of the day-long "Question and Answer" session on Friday.

Thursday, October 20

Industrial relations session. "A Day's Work for a Day's Pay," C. V. Hussey, Arkansas Power & Light Co.; "A Theory of Management Development," W. E. Bennett, Cities Service Refining Corp., Lake Charles, La.; "Cost Reduction Program," C. S. Russ, E. I. du Pont de Nemours, Houston; and "The Negotiation and Administration of Labor Agreements," H. R. Shepherd, Cities Service Oil Co., Bartlesville, Okla.

Friday, October 21

Technical session. Engineering panel: D. F. Ferguson, Refinery Engineering Co., Tulsa; R. R. Maddox, Blaw-Knox Engineering Co., Philadelphia; D. E. Womeldorph, Houdry Process Corp., Philadelphia; J. S. Clark, Esso Research & Engineering Co., Linden, N. J.; and a representative from Universal Oil Products Co., Des Plaines, Ill.

Refining panel: E. A. Heike, Premier Oil Refining Co., Fort Worth; N. S. Banta, Pure Oil Co., Nederland, Tex.; O. A. Fuchs, Pan-Am Southern; Max S. Moody, Lion Oil Co., El Dorado; and L. K. Buchanan, Bell Oil & Gas Co., Ardmore, Okla.

Panhandle Gets More Gas

WASHINGTON.—The Federal Power Commission moved last week to avert a shortage of natural gas along the Panhandle Eastern Pipeline Co. system.

It will permit Panhandle to make 167,000,000 cu. ft. daily of gas available to its customers from December 1 to March 31 without waiting on a decision on its applications for permission to build additional facilities.

The FPC also granted a temporary permit to Trunkline Gas Co. to deliver an additional 80,000,000 cu. ft. daily of gas to Panhandle through facilities built under temporary authority last June.

On a temporary basis Panhandle will be allowed to build 132 miles of lateral loop lines at an estimated cost of $4,-474,900 to handle the additional gas.

Smog Rule Added

Tighter controls adopted for oil-water separators

LOS ANGELES.—The Air Pollution Control Board has adopted a new rule covering oil-water separators in Los Angeles Basin refineries.

Under the new regulation, Rule 59, oil-water separators at refineries must have one of the following:

. . . **A cover totally** enclosing the liquids.

. . . **A floating roof.**

. . . **A vapor-recovery** system.

. . . **Or other equipment** equally efficient.

The new rule goes into effect July 1, 1956.

Robert Chass, chief of the Air Pollution Control District evaluation and planning staff, testified at a recent hearing that in 1950 some 50 separators and skimming ponds in the Los Angeles Basin emitted 95 tons of hydrocarbons daily. Under a voluntary program, refineries have cut hydrocarbon emission at such installations to 15 tons today, Chass added. He estimated that it will cost refiners between $500,000 and $1,500,000 to bring all separators and skimming ponds into conformance with the new rule.

The most recent installation to eliminate vapor losses from separators was at Richfield Oil Corp.'s Watson refinery. A totally enclosed separator was added at a cost of about $200,000. Richfield spent an additional $300,000 in eliminating old open pits and in other works.

S. Smith Griswold, A.P.C.D. chief, said the new regulation does not apply to oil and gas separators in the field. Studies of losses from these units are now being made.

Truck Turbines Due First

INDIANAPOLIS.—Gas-turbine engines first will be used in heavy-duty trucks and later in passenger cars.

This is the prediction of Dr. Donald N. Frey, associate laboratory director of Ford Motor Co.'s engineering staff.

Frey told the Indiana Independent Petroleum Association that problems of design, performance, and cost of gas-turbine power plants will be solved. The turbine, he said, is not yet comparable to today's internal-combustion engine in operating efficiency.

There are special heat problems related to fuels and lubricants, Frey said, and he urged the oil industry to do its own research to overcome carbon deposits which, he said, may pose a serious problem.

Tide Water's Highway of Power

This ditch will hold part of the 48 miles of electrical ducts encasing 200 miles of underground power lines which will serve Tide Water Associated Oil Co.'s new 130,000-bbl. Delaware Flying A refinery. The lines will be embedded in concrete and buried underground. Another 200 miles of overhead lines will furnish power for the refinery's street and flood lights, telephone system, interior illumination and to drive hundreds of motors operating everything from delicate instruments to huge pumps and compressors.

Refining Briefs

SCOTTSBLUFF, Neb.—A new $250,000 catalytic reforming unit will go into operation November 10 at Consumers Cooperative Association's refinery here. Bruce McCully, first assistant general manager, said the reformer will boost the octane rating of the plant's regular gasoline from 85 to 90. The premium gasoline number will go from 92 to 95. The plant has a capacity of 2,200 bbl. daily.

TULSA.—Tuloma Gas Products Co. has contracted for the L.P.G. production of the Destrehan, La., refinery of Pan-Am Southern Corp. Tuloma owns truck loading and storage facilities adjacent to the refinery.

NEWCASTLE, Wyo.—Sioux Oil Co. has let a contract to Litwin Engineering Co., Wichita, to build a 750-bbl. Houdriformer at its refinery here. The three-reactor unit, designed by Houdry Process Corp., will use a Houdry Type 3 platinum catalyst. Since the naphtha cut of sweet Newcastle crude is low in impurities, there will be no pretreatment of the charge stock.

SARNIA, Ont.—Imperial Oil, Ltd., has let a contract for a $4,500,000 wax plant at its refinery here. The new plant will have a capacity of 35 million pounds of wax yearly. It will be built by Fluor Corp. of Canada. Also included in the project is a Hydrofining unit which will be used to upgrade high-quality waxes and lubricating oils. The work is expected to be finished by October 1956.

LOS ANGELES.—Bankline Oil Co. will build a 4,000-bbl. daily fluid coker to increase gasoline output at its Bakersfield, Calif., refinery. Fluor Corp., Ltd., has begun detailed engineering and will start construction early next year. Completion is due late in 1956. The coker will convert topped crude and thermally cracked fuel oil to coke, gasoline, gas, and gas-oil. The gas oil will be thermally cracked to recover more gasoline.

Visco Laboratory Reports

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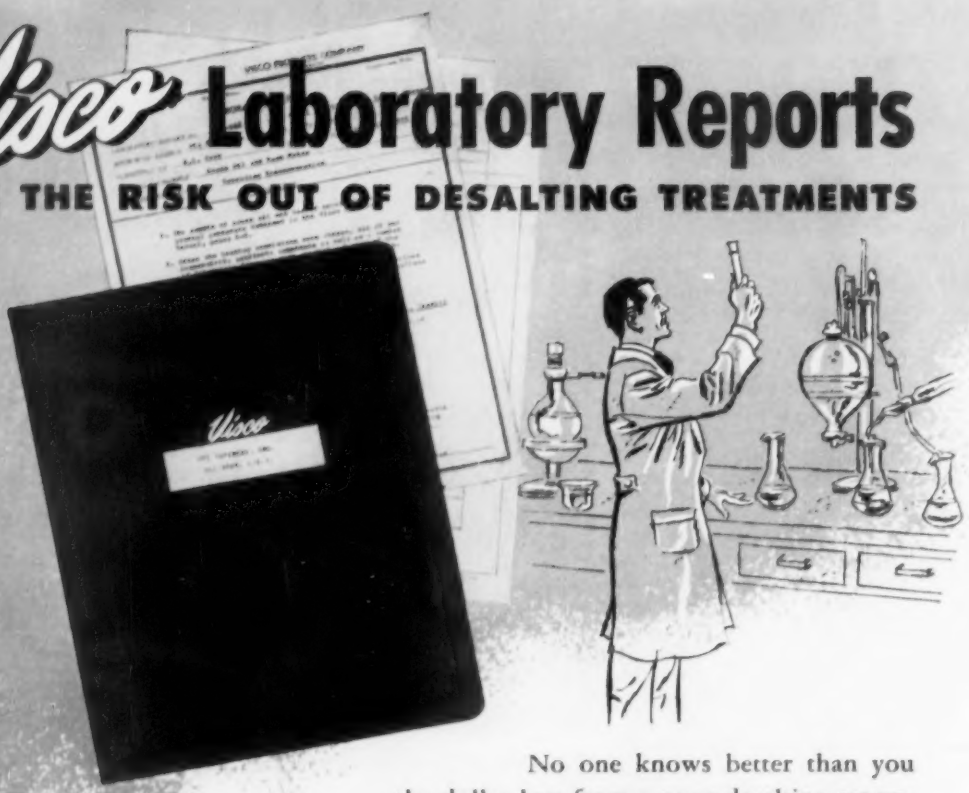
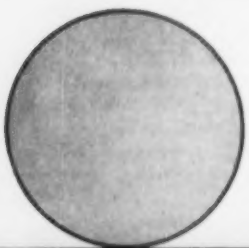


No one knows better than you the dollar loss from a poor desalting set-up.

And you know, too, there's no such thing as a blanket cure-all. But a Visco Laboratory Report *does* point the way to the results you want — from every type of crude — at no added cost to you.

Photomicrograph—
Emulsified refinery crude

In a typical case, 20 or more separate desalting compounds and laboratory formulas may be checked and all contributing factors will be considered before the final desalting recommendation is made.



Photomicrograph—Emulsified refinery crude after Visco desalting

If you would like our desalting recommendation for your crude, send Visco a five-gallon can of the crude and one gallon of the water used in your refinery desalting. Or better yet, check with your Visco representative, and he will arrange for these services.

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Well Nears Record

Louisiana test is 672 ft. from world's deep mark

NEW ORLEANS.—Richardson & Bass 1 LL&E-Humble "L" already by far is the deepest hole ever drilled in Louisiana. And early last week it needed to make only another 672 ft. to smash the world deep-drilling mark.

The deep test had reached 20,810 ft. and was drilling ahead. It is located 35 miles southeast of here in the Mississippi Delta marshes of Plaquemines Parish.

At its depth, the important wildcat is the second deepest ever drilled. It has climbed two notches up the ladder since drilling was resumed in early September. Operator had shut down several weeks to test four noncommercial shows between 16,600 and 19,035 ft.

The now-displaced second and third deepest wells were Superior Oil Co. 1 Unit, a 20,521-ft. wildcat drilled in 1949 in Sublette County, Wyoming, and George Vasen 1 Fee in Stone County, Mississippi, which went to 20,450 ft. in 1953.

More potential pays . . . Ed Hill, vice president and general manager of Richardson & Bass at Fort Worth, told the Journal last week the wildcat had encountered more encouraging potential pay zones. These, however, weren't to be tested immediately.

Drilling progress slowed for coring operations over the October 8-10 weekend. Operator took 3 days to core from 20,729-57 ft. with a 5 15/16-in. bit. Hill said the coring operation has been completed and better time probably will be made with return to regular drilling.

Hill affirmed the firm intended to drill to 22,500 ft. or beyond *(The Oil and Gas Journal, July 11, 1955, page 98)*. "We'll go that deep," he said, "unless we get our head knocked off."

Rig on the project is Richardson & Bass' No. 25, a National 34-10 steam unit with five boilers. The rig is mounted on a barge built by the organization in 1947.

Associated with Richardson & Bass on the venture are John W. Mecom of Houston and Freeport Sulphur Co., New Orleans.

Salt-Water Injection Planned

HELENA, Mont.—The Montana Oil and Gas Conservation Commission has approved a request of Murphy Corp. to inject salt water into the East Poplar field.

Murphy, unit operator in the field, will install a $175,000 system to return salt water produced from its Madison formation through two nonproductive wells in the western part of the field. In the past, Murphy disposed of the brine in open pits. This operation was threatening the town of Poplar's water supply.

Merger Approved

Three Michigan refiners select November 30 date

ALMA, Mich.—The merger of Leonard Refineries, Inc., Mid-West Refineries, Inc., and Roosevelt Oil & Refining Corp. will become effective November 30. Leonard will be the surviving company and will keep its headquarters in Alma.

Final approval was given the three-way combine at a Leonard stockholders' meeting. The largest proxy representation in the company's history endorsed the merger by a unanimous vote.

The merger will be effected by a stock exchange. However, officials didn't reveal on what basis the exchange will be made. A Leonard spokesman did say that the new firm would request a listing on the American Stock Exchange, where of the three firms only Mid-West carried a listing.

Brand names of the three companies will be retained and used, said Reid Brazell, Leonard president. The three refineries involved have a total crude capacity of 31,500 bbl. per day. These facilities include a catalytic cracking unit at the Leonard refinery, and catalytic reforming units at Mid-West's plant in Alma, and at Roosevelt's Mount Pleasant refinery. At Alma, Leonard will complete a 3,500-bbl. per day Ultraforming unit and a 4,200-bbl. per day Hydrofining unit late this year.

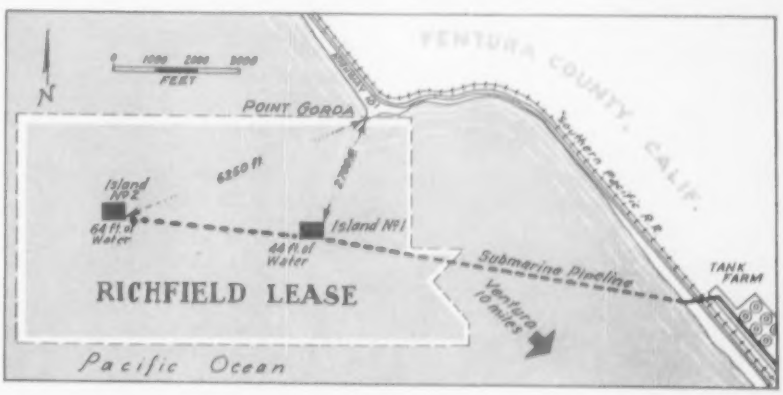
On December 1, the day following official merger of the three companies, a meeting will be held in Alma, at which officers of the company will be elected. Meanwhile, no details are available on the corporate setup or management.

Canadian Gas Project Pushed

WASHINGTON.—The Federal Power Commission will short-cut its proceedings to get a quick decision on the plan of Pacific Northwest Pipeline Corp. to import 300,000,000 cu. ft. of natural gas daily from Canada.

Hearings on the application wound up late last month. Instead of writing a report, the examiner was directed to send the case direct to the full commission for immediate consideration.

Coal and oil interests fighting the project objected to the FPC's action. But the commission pointed out that it is in the public interest to get a decision before Pacific Northwest starts building lines to handle the Canadian gas.



Showdown Set On Island Drilling Sites

LOS ANGELES.—Deadline for filing objections to Richfield Oil Corp.'s proposed artificial islands off Point Gorda in the Rincon area has been set for October 21. Objections to the two islands must be on a navigational hazard basis only. They must be submitted to the district engineer's office in Los Angeles.

Richfield plans to build submarine pipelines and a small-craft landing pier as well as the two earth-filled islands. The company will use the islands as drilling sites for developing its 1,175-acre state tidelands lease. This offshore lease is located approximately 10 miles northwest of Ventura.

One island location is 2,700 ft. seaward. The other is 6,250 ft. offshore. Both will be 320 ft. wide and 440 ft. long at the top. They are located in 44 ft. and 64 ft. of water.

Problem: Getting More Engineers

- Oil companies are becoming concerned over the bleak prospects of filling their field and laboratory staffs
- No matter what's done, the shortage will get worse before it improves and any payoff is years in the future

Gene T. Kinney

OIL talent scouts will be on college campuses in record numbers this fall. They will be bidding against each other—and the rest of the industry—for the next spring's short crop of technical graduates.

The better colleges and universities report three to seven jobs await each graduate. Good research prospects will get as many as 10 offers, sometimes more.

Recruiters will spend anywhere from a few hundred to a few thousand dollars for each technical man they add to the payroll. Some companies will visit more than 50 campuses. They will interview between 20 and 50 prospects for every research scientist hired.

And when the wooing is done, recruiters will return home at least half empty handed.

There just aren't enough engineers and scientists to go around, and there's no telling when there will be.

Even should the total number be sufficient, there would not be enough high-caliber graduates to fill top-drawer jobs. Companies still choose to leave an important position vacant rather than hire an unqualified man.

So at a time when it is most difficult to squeeze a profit out of a barrel of oil, there is a shortage of the very resource that must be relied on to solve new problems. At least part of the blame can be laid at industry's own door.

The background . . . In the past 15 years the number of companies bidding for technically trained graduates has increased threefold. To meet the abnormal demand, industry raided high school and college faculties.

Graduates who a few years ago might have chosen teaching are rejecting the profession in favor of greater opportunity and more money in industry. The upshot is:

. . . Too few high school teachers to inspire and recruit the bright students into science.

. . . Too few teachers and professors to educate the ones who do choose a technical career.

The effect on college faculties is summed up by the dean of one leading institution:

"We are piecing out by excessive use of graduate assistants, part-time teachers, and people in industry who volunteer their time, but it is impossible to get a replacement now. It's bound to get worse before it gets better, and there is nothing to indicate the tide will turn unless something more decisive is done.

"Whether we like it or not," the dean continued, "our older professors are retiring and dying. The younger men, including some who would otherwise be teachers, are attracted by much more lucrative positions in industry. And there are not nearly enough to supply the industry demand, much less the teaching demand. Each shortage seems to breed on the other."

But industry's hiring practices are only one of many reasons back of the shortage, complicated because the small depression baby crop is reaching manhood in boom times.

The basic trouble . . . Basic to the whole problem is this fact: The demand for science graduates has increased sharply because of postwar technological expansion, while the trend is toward a smaller precentage of students choosing technical careers.

Hardly a fourth of American high school students bother to study algebra compared to more than half 50 years ago. And the percentage drops sharply when you get to physics, chemistry, plane and solid geometry, and trigonometry.

So science has a fighting chance at only a tiny share of high school graduates in the first place. Why are math, physics, and chemistry so unpopular, even among these who can grasp the subjects easily? Many reasons have been offered. Among those most often heard from oil-industry research leaders are:

. . . We've bred a generation of drones —mathematics and the sciences seem to frighten youngsters nowadays. The emphasis today is on "learning to live." Faced with a bewildering assortment of more than 200 subjects in some schools, students skip the toughies like trig. They elect "business arithmetic." They are lazy. Or they see lucrative opportunities in business without the academic grind.

. . . Anti-intellectual climate — scientists, somehow, have been made out in some circles to be villains. "Eggheads" are unpatriotic, or worse.

. . . Inadequate high school curricula —fully half our schools don't even offer chemistry or physics. Students in these schools have little chance to find out what science is all about.

. . . Not enough science teachers— one reason for poor curricula. There are not enough good ones to spread the gospel of science to teen-agers, to explain the opportunities and rewards of a technical career, and to inspire them to go ahead.

These are some of the obstacles that must be overcome if the backlog of some 30,000 engineer-scientists is to be wiped out.

What is being done . . . Although the road is long, it is encouraging to know we have made at least a modest start.

The great educational foundations have record budgets for scholarships, buildings, and equipment.

Industry is contributing more scholarships and fellowships, more money for labs and other facilities to upgrade college training and handle more students. Companies are giving summer work to students and teachers.

Professional societies and industry associations are helping. The American Association of Oilwell Drilling Contractors, for example, is giving honorariums to outstanding engineering teachers. Last year it presented $400 to teachers in five different schools. The theory is: A scholarship would touch only one student. And he has already chosen science. An inspired teacher might influence hundreds.

Perhaps the most spectacular efforts to encourage and develop budding scientists in high schools are science fairs. Project competition ranges from the community to the national level. Educators are trying to increase participation in these fairs. They are organizing science clubs to stir interest, develop youthful talent, and guide members toward a science career.

Professional societies also are recognizing the need to get at the root of the problem—in the secondary schools. The A.A.P.G., for example, reports success with its geology merit badge in the Boy Scouts. Societies turn out brochures explaining their professions, and what opportunities they offer. Hobby kits are produced for the same purpose.

The societies offer speakers at high school assemblies to tell the story of their professions.

A "30-hour club" is being organized to enlist the services of professional men 30 hours a year. The volunteers would judge science fairs, help sponsor science clubs, offer vocational counseling, speak before clubs and assemblies, and serve as consultants according to needs of teachers and schools.

Teacher the key . . . Industry is showing increasing awareness that the high school science teacher is the key to early recruitment programs.

Oil companies realize that it is the teacher who must light the first spark of interest; that it is the teacher who must inspire the student to tackle physics and trig, and prepare him for college. The new-found interest in teachers takes various forms.

In Dallas, for example, Magnolia Petroleum Co. hires five high school science teachers in its research laboratory each summer. The purposes: to give the teachers an added source of income so they will be encouraged to remain in their profession, and to give them an insight into industry's use of the subjects they teach.

An added virtue, Magnolia figures, is that the teachers can give their students concrete examples of the way industry applies the principles of chemistry, physics, and the other sciences. The result, the company hopes, will be that science will become more interesting to the students and more will be encouraged to follow it as a career.

In New York, Shell Oil Co. is continuing its study of ways to develop more scientists. One point of a tentative eight-point program is some form of aid to high school teachers.

So a start has been made to include teachers and teaching prospects in the selling job being done on young scientists. Still it is hard to convince a college graduate that he should turn down a beginning salary of $350 to $450 a month in industry for scarcely more than half that amount in teaching. This holds true in high school and college as well.

Industry has decided the persuasion will have to be backed up with money if it is to be effective. Executives are now in the throes of deciding how much money they should give, just where their responsibilities lie, and what form the aid should take.

The need for action will be pointed up again as engineer recruiting steps up this fall. Carter Oil Co. figured it spent $2,200 last year for each research scientist hired. The company had to interview 1,020 students on 45 college campuses to add 25 engineers or scientists to the pay roll. Carter plans to expand recruiting to perhaps 55 colleges this year.

A Journal survey indicates that Carter's hiring costs for lab technologists are typical. An Atlantic Refining Co. executive pointed out that you take only the top prospects for research jobs. And each high-caliber student has from 10 to 20 offers. You have to interview at least 10 to get 1. Most want to shop around, investigate the company, and visit its laboratory.

Stanolind Oil & Gas Co., a leader in research, interviews 15 to 20 prospects for each man added to the research staff. The company finds it is five times as hard to fill a laboratory position as to hire a geologist or petroleum engineer for the field.

Every company interviewed expected the shortage to become more acute. The few corrective measures in effect are a start. But the industry sees no sign that they will come close to wiping out the big gap between the technical manpower demand and the inadequate output of our colleges.

Big-Inch Pipe "Planted" for Gas Storage

SAN DIEGO.—Two miles of 30-in. pipe is being buried at Encanto, Calif., to increase the gas-storage capacity of San Diego Gas & Electric Co. at its "equating" station there. The company has been using 26,500 ft. of buried 30-in. pipe for storage. The current addition of 11,250 ft. will bring storage capacity of the station to 13,000,000 cu. ft. The stored gas is used to meet peak demands on the company's distribution system. Two electrically driven compressors will be able to fill the buried storage system to 925 psi. in 8 hours. The company already has storage for 1,000,000 gal. of propane, which will produce the equivalent of 87,000,000 cu. ft. of natural gas. Thus the company, when the present project is completed, will have the equivalent of 100,000,000 cu. ft. of storage, or roughly enough for 50 hours of average normal demand.

Hercules Expands

Firm licensed to make new type polyethylene

WILMINGTON, Del.—Hercules Powder Co. plans to enter a new chemical field with manufacture of low-pressure polyethylene at a new $10 million plant in Parlin, N. J. The product will be marketed under the name of "Hyfax."

The Parlin plant will have an annual capacity of 30 million pounds. Facilities are scheduled for completion late next year. But Hercules announced it will start marketing small tonnages of the polyethylene early in 1956.

The company disclosed it has been licensed to use the Ziegler process and will get its introductory material from the Farbwerke Hoechst A.G. in Germany. Hercules said its contract with Hoechst will permit it to sidestep the customary pilot-plant stage and immediately build a commercial plant. The Hoechst contract also calls for continuing exchange of research information between the two companies.

The process Hercules will use was developed by Dr. Karl Ziegler of the Max Planck Institute of Muelheim, Germany. Dr. Ziegler discovered that ethylene could be polymerized to give a new type of polyethylene. The new product had many properties improved over the old type. His discovery resulted from work on new types of catalysts. The Ziegler catalysts are expected to open a new field of catalytic chemistry particularly adaptable to the oil industry.

Hercules under its contract with Ziegler also has the exclusive right to sell a basic component of the Ziegler catalyst in the United States and Canada.

Entry of Hercules into the polyethylene field marks a further diversification of the company. It augments nitrogen, cellulose, and wood naval stores which have been the chief chemical materials used by the company in its 42 years of existence. Hercules was founded as a maker of industrial explosives, but now does about 80 per cent of its total business in other chemical materials.

Gas Decision Shelved

WASHINGTON. — An examiner's decision calling for end-use controls on natural gas has been shelved by the Federal Power Commission.

The FPC last week reopened Northern Natural Gas Co.'s proposal to supply natural gas on an interruptible basis to Northern States Power Co.'s Black Dog station near Minneapolis. It was joined with a subsequent application to build a 654-mile pipeline.

The commission explained that any decision at this time on the Black Dog application might prejudice later determination of the pipeline project.

In his report on the Black Dog application, Examiner Francis L. Hall recommended denial. He held that the company should not be allowed to sell gas for boiler fuel at prices he said would be below the actual commodity cost.

Shut-in Delay Asked

New line will end excessive Jameson flaring, Texans say

AUSTIN.—Operators have asked the Texas Railroad Commission not to shut in any wells in the Jameson (Strawn) field now. They want a delay at least until next year for that area in Coke County, West Texas.

The oil men claimed by then excessive gas flaring would be halted. El Paso Natural Gas Co. expects to finish a pipeline into the field by January 1. It will be capable of taking 60 million cubic feet daily of residue gas. More than 50 million cubic feet daily is now being wasted.

The operators made their request at a commission hearing called to see why such a large volume of gas was being flared. A shut-in order was in prospect until the gas could be conserved.

Oil spokesmen frankly admitted that more than 50 million cubic feet of casinghead gas daily is being vented or flared. Gas from the 450-well field has exceeded capacity of present gasoline plants and pipelines.

The companies contended gas-injection isn't economically feasible in the field. They added that a shut-in order now would be premature in view of the new pipeline plans.

Spokesmen for Perkins-Prothro Co., F. Kirk Johnson, and other operators predicted drainage of production across lease lines woud occur if the commission allowed wells not wasting gas to produce while shutting in the others.

Commission Chairman William J. Murray, Jr., said he doubted the additional facilities would take care of the growing gas output by next spring. He claimed gas-oil ratios are sure to climb still higher and could jump 50 per cent by March.

Jameson is a solution-gas reservoir. Average gas-oil ratio is already 3,500:1. This is considerably above the penalty limit of 2,000:1.

Ken Smith, production manager for F. Kirk Johnson, disputed Murray. He said the gas-oil ratio increase would more likely be only 25 per cent. He said ratios will drop in the oldest portions of the field.

The commission is expected to decide the Jameson issue within a few weeks.

Mammoth Drilling Barge Launched

A drilling barge the length of a football field has been launched at Beaumont Bethlehem Shipyard. It took 5 months to build and workers will spend another 45 days equipping the vessel for Humble Oil & Refining Co. The oil firm will use the barge for erecting oil well drilling platforms in the Gu'f of Mexico. It is 300 ft. long, 90 ft. wide, and 20 ft. deep. Living quarters will be provided for 58 men. It has steam boilers, electric power generators, pumping and welding equipment. Two cranes of 250-ton and 40-ton capacity will be installed on deck where a helicopter landing field also will be set up.

Production Meet Set

Three-day conference is scheduled by Penn State

UNIVERSITY PARK, Pa.—Penn State University's nineteenth technical conference on petroleum production will be held here November 16-18.

The meeting is held in cooperation with the Pennsylvania Grade Crude Oil Association. Arrangements are being handled by Prof. C. D. Stahl, department of petroleum and natural gas.

The program includes the following technical presentations:

Wednesday, November 16, 2 p.m.

"Fabric and Permeability of Some Typical Sediments," by J. J. Hutta; "Petrography of Pocono Sediments of Western Pennsylvania," by H. W. Shadle and J. C. Griffiths; "Petrographic Investigations of Weir Sand, Martha Pool, Kentucky," by J. C. Griffiths and H. W. Shadle; "Electric Logging Parameters of Weir Sand," by E. J. Moore; and "X-Ray Diffraction and K-Factor Studies of Clay Content of Artificial Cores," by B. F. Howell, Jr., and J. Cervik.

Thursday, November 17, 9 a.m.

"Petroleum Displacement by Detergent Solutions," by R. T. Johansen, H. N. Dunning, and Jeanne W. Beaty; "Field Test of a Detergent in Oil Recovery," by H. N. Dunning, R. T. Johansen, C. J. Walker, J. P. Powell, and J. W. Watkins; "Effect of Reactions Between Interstitial and Injected Waters, on Core Permeability," by G. Bernard; and "Petroleum Conservation in Venezuela," by J. Jones-Parra.

November 17, 2-5 p.m.

"Comparison of Air Permeability and Water Input Profiles," by R. G. Jones; "Miscible-Fluid Displacement in Porous Media," by L. G. Paulsell and J. C. Calhoun, Jr.; "Fluid Flow in Synthetic Porous Media," by F. Coley, S. Marsden, and J. C. Calhoun, Jr.; and "Use of Radioactive Tracers in a Model Five-Spot," by R. E. Wainerdi and R. F. Nielsen.

Friday, November 18, 9 a.m.

"Natural Chemicals From Natural Gas," by A. J. W. Headlee; "Unsteady-State Behavior of Linear Gas Storage Reservoirs," by J. Warren; "Heat Transfer by Fluid Displacement in Porous Media," by T. Hadidi, R. F. Nielsen, and J. C. Calhoun; and "Liquid Saturations in Porous Media, by Matching Refractive Indices," by J. Steber and S. Marsden.

Cabot Carbon Expanding

SARNIA, Ont. — Cabot Carbon of Canada, Ltd., plans to expand its plant facilities here. The work will push output of oil furnace carbon blacks from 20 million pounds to 55 million pounds per year.

P. H. J. Delacour, executive vice president of Cabot Carbon of Canada, said the plant work should be completed in 2 months. He added the new output should be sufficient for oil furnace black requirements of the entire Canadian rubber-manufacturing industry.

WATCHING WASHINGTON

Bertram F. Linz

Danger in Oil Cartels

A high Interior official warned the oil industry last week to guard against efforts to internationalize oil.

Any plan for international commodity agreements, in or out of the United Nations, carries a threat to oil, Assistant Secretary Felix E. Wormser said.

The theory is this: Since such commodities as oil are subject to world-wide force of supply and demand, any control to improve market or prices can best be handled by some international agency. But in the past, Wormser pointed out, the theory has broken down when any nation's interest is hurt.

Wheat and sugar have been put under commodity agreements. But so far the United States has resisted efforts to control industrial commodities. It rejected a plan for a tin agreement a few years ago. It has indicated it will not be a party to any oil agreement, as suggested to the United Nations.

The idea of oil control through the U. N. is not new. It was suggested 9 years ago—less than a year after the U. N. was founded. It has come up repeatedly, most lately in the form of a study of the price of oil in Western Europe. The study hinted that international price control was needed. The State Department in March found it necessary to quash the idea as contrary to U. S. policy.

Dave Beck Man to Watch

Walter Reuther of the C.I.O. is growing as a political figure. John L. Lewis has a little one-man empire of coal miners. But the man for the oil industry to watch is Dave Beck of the teamsters' union.

Beck admittedly is out to organize all of the more than 10,000,000 truck drivers of the nation. He already has a pretty tight control on the Pacific Coast. Now he's moving eastward.

Labor relations men say Beck aims to organize drivers regardless of the industry they work in. They say that when he has enough to make his orders stick he will demand one contract covering all employers who use trucks. There will be no bargaining by industry. The country will be split into areas, with a "director" in each reporting back to Beck.

If Beck ever reaches the point where he can paralyze industry, he is likely to tangle with the federal Government. He apparently realizes that. The teamsters' union has just put up a massive headquarters building in Washington, as close to the Capitol as it could get. Some see in it a gesture of defiance to Congress.

Secret of Deuterium Sought

There's no need to worry about the world's future energy supply. Scientists are busy unlocking one of nature's secrets. When they do, everything will run by electricity. And there'll be enough of it take care of many times the present rate of energy consumption for more than a million years.

The secret word is "deuterium." It's a heavy isotope of hydrogen. In the sun and stars hydrogen nuclei combine to form helium nuclei, releasing vast energies. The process is called thermonuclear burning. This is what makes the bang of the hydrogen bomb.

Here on earth, the deuterium is present in water at the rate of one nucleus to every 6400 nuclei of ordinary hydrogen. Even at that low proportion there's an awful lot of deuterium in the oceans. The trick is to release its energy in a controlled manner for the generation of electrical power.

It would be easy except for one or two little things. Thermonuclear burning occurs only at tremendous temperatures, above 1,000,000° F. Those are temperatures found at the centers of very hot stars, or briefly in the explosion of an atomic bomb.

The problem is to get such temperatures in a gas confined within walls that remain relatively cool, control thermonuclear reaction when it occurs, and extract the energy released so it can be used to make electricity.

So oil men can go on drilling wells. Gas men needn't worry about their pipelines being outmoded. Coal miners can continue to dig their fuel. At the best guess, the very youngest scientists now puzzling over sea water electricity will be great-grandfathers before they find the magic key.

Colombian Line Complete

119-mile, 12-in. line built by Texaco subsidiary opens Velasquez field to full production, new market outlets

A NEW 113-mile, 30,000 bbl. daily crude pipeline which will open a major central Colombian field to full production has been completed.

The 12-in. line from Velasquez field to Galan, near the Barrancabermeja refinery, has been completed and tested by Texas Petroleum Co. (The Texas Co.) It was built by Foster Wheeler Corp. and Panama-Williams, Houston.

The line will be filled in a few weeks and will be placed in operation as soon as the Colombian Government approves the company tariff.

World market outlet . . . The new pipeline has a connection at Galan with the main Andian National system, which can move the Velasquez crude north to the Caribbean seacoast at Mamonal and to world markets. This common carrier Andian system has been moving Casabe, De Mares, and Dificil crude up to now.

Velasquez field can be opened to an initial production of 17,500 bbl. daily with the pipeline outlet. It has a potential of at least 25,000 bbl. daily.

The field was discovered in 1947 on Texas Petroleum's Teran-Guaguaqui property, which it owns in fee. The 400,000-acre tract extends into the mountainous regions, but at least half is regarded as worthy of exploring.

It was not until the last 2 years that Texas Petroleum began concentrated development of the field. It has 80 wells producing from Lower Tertiary continental deposit beds at about 8,000 ft.

Field still developing . . . The company has four rigs running in the area. Two of them are wildcatting.

For the past 3 years the field has been furnishing about 2,500 bbl. daily to a small topping plant operated by Esso Colombiana, S. A., at La Dorado on the Magdalena River. The topping plant went on stream early in 1952 and has received crude from Velasquez 35 miles away by a 4-in. and a 6-in. line.

In addition, Velasquez has been supplying 1,500 to 6,000 bbl. daily by river barge to the government's refinery at Barrancabermeja.

The La Dorada topping plant will continue to get crude from Velasquez, and the field will furnish some crude to Barrancabermeja. The balance of the field's production will move to the Caribbean coast by the Andian pipeline.

New Refinery Due

Bechtel gets contract for 25,000-bbl. Colombia unit

BECHTEL CORP., San Francisco, will build a 25,000-bbl. daily refinery for International Petroleum Co., Colombia, Ltd., near Cartegena on the Caribbean coast of Colombia.

International decided to build the plant nearly 2 years ago but the contract was not let until recently. The project was recommended by a government-industry commission studying Colombia's oil needs in May 1953.

The new refinery will be located near the Caribbean terminal of the Andian National pipeline, a 10-in. common carrier that links Central Colombia's De Mares, Casabe, and Dificil fields with deep water ports.

The refinery's output will go initially to meet domestic requirements on the west coast of Colombia. This area is now served by imports from Aruba. Estimated cost of the new plant is $30,000,000.

The government-appointed commission recommended building the refinery with private capital. For a time, Empresa Colombiana de Petroleos, the official government company, considered building the refinery, but International offered to undertake the project in December 1953.

Other refinery . . . The newly enlarged Barrancabermeja refinery on the Magdalena River in Colombia's interior is the only major processing installation in the country. It has a 37,250-bbl. daily capacity since completion of the modernization program last year. The refinery and several small topping plants in the Magdalena Valley serve the interior of the country.

The Barrancabermeja refinery reverted to the Colombian Government 4 years ago when the old Tropical Oil Co. concession at De Mares expired. Since that time the refinery has been operated for the government by International, successor to Tropical.

Brazil Gets Change

Solution to oil troubles promised by new regime

FOREIGN oil operators may get a break in Brazil within the next year.

Final results of the national elections will not be known for weeks. But it seemed apparent last week that Juscelino Kubitschek will be next president of Brazil. He campaigned as the heir of the late Getulio Vargas.

The vice presidency likely will go to Jaoa Goulart. He was proud to be called "the Little Peron" until the army forced his resignation as minister of labor under Vargas.

Vargas was Brazil's strongman until his suicide last year following ouster by a military coup. He slammed Brazil's door shut to foreign oil capital. The restrictive "state only" oil policy and creation of Petrobras, the government oil monopoly, were children of the Vargas government.

The succeeding regime of President Joao Cafe Filho did nothing to change this nationalistic policy.

Brazil's crude-oil production of only about 5,500 bbl. daily barely scratches the surface of the nation's consumption of more than 160,000 bbl. daily. There has been increasing clamor in Brazil for a revision of the Petrobras monopoly and opening the country to foreign oil capital in an effort to solve its oil needs. What will happen now is still a question.

But during the campaign, Kubitschek said he would wait 1 year after his election to see if Petrobras solved the oil problem. He added: "If things are unchanged at the end of this period, I shall seek another solution." He did not elaborate on his plans.

NATO Pipeline Bids Asked

American companies have been invited to bid on a $1,034,880 pipeline in the Netherlands.

The project, part of the North Atlantic Treaty Organization network of European oil supply lines, calls for 55 kilometers of 8-in., 7 kilometers of 6-in., and 4½ kilometers of 4-in. pipe. The pipe is estimated to cost $346,104, the construction $686,400, and supply valves $2,376.

Firms wanting to bid on the project should advise both the Commercial Intelligence Division of the Department of Commerce in Washington and De Directeur Ndebouwen, Worken En Terreinen, The Hague, before October 31.

Germans Expanding

First big petrochem plant will produce polyethylene

WEST GERMANY'S first large petrochemical plant went on stream last week at Wesseling, on the Rhine between Bonn and Cologne. It will make 10,000 tons of polyethylene a year from refinery gases.

The plant originally was designed for a 6,000-ton yearly capacity. It is owned jointly by Badische Anilin und Soda-Fabrik of Ludwigshaven, one of the I. G. Farben successor corporations, and Deutsche Shell AG of Hamburg.

Germany has long had a large synthetic-materials industry based on coal. But this is its first large installation in the petrochemical field. Refinery gases to feed the new plant come from a plant at Wesseling. It originally was designed to produce gasoline from brown coal, but is now being used by the Royal Dutch-Shell Group for oil refining. Refinery gases go through fractionating and reforming processes to produce ethylene. This is then polymerized under pressure to produce polyethylene.

This process has been used by BASF in its Ludwigshaven plant to produce about 400 tons of polyethylene a year from coke-oven gas.

Refinery Exceeds Capacity

Puerto Rico's first refinery near San Juan is now producing 13,000 bbl. daily, about 2,500 bbl. daily over its rated capacity.

Walter Nelson, manager of the plant for Caribbean Refining Co., said last week that the refinery is producing gasoline of 5 per cent better octane than was estimated at the start of operations last May. The refinery operates on eastern Venezuelan crude.

Puerto Rico's second refinery, a $25 million plant being built by Commonwealth Refining Co. near Ponce on the southern part of the island, will go on stream early next year.

Reds' Oil Building Down

Russia is showing increased concern over a lag in oil industry construction in fast-growing industrial regions beyond the Volga River.

The official government newspaper Izvestia complains that the Ministry of the Oil Industry "has systematically failed to fulfill plans for building and commissioning refineries in the eastern part of the country." It said that from 1951 through 1954, the first 4 years of the current Five-Year Plan, only 804 million rubles were invested in building the Omsk oil refinery, compared with the estimated construction cost of two billion rubles ($500,000,000).

Izvestia emphasized that the need for new refinery capacity in this area is urgent since "well over 60 per cent" of Russia's oil is now produced east of the Volga.

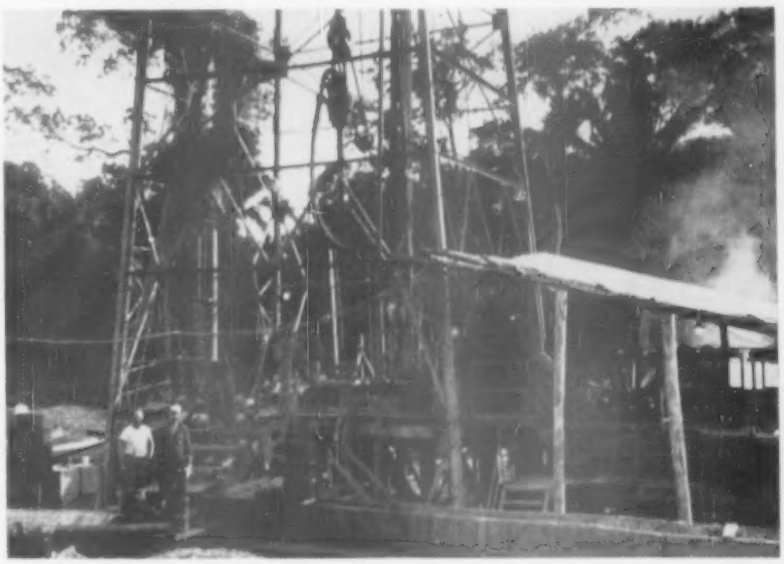
Tax Relief Ups B.P. Net

A new income tax decree in Kuwait has increased the 1954 consolidated earnings of British Petroleum Co., Ltd., by $28,000,000.

Revisions in the Persian Gulf shaikhdom's income tax decree allows B.P. to take credit for Kuwait taxes in paying income taxes in the United Kingdom. The company has been seeking this tax relief for several years.

B.P. has already reported consolidated net earnings for 1954 as $68,179,644. Another $28,000,000 can now be shifted from B.P.'s accounts to put the taxes into the earnings column.

British Petroleum owns half interest in Kuwait Oil Co., Ltd., through D'Arcy Kuwait Co. The other half is owned by Gulf Kuwait Co. The jointly owned company is now producing more than 1,100,000 bbl. daily from two fields in the 6,500-sq. mile shaikhdom.



Gulf Drills in British Honduras

THE British Honduras Gulf Oil Co., wholly-owned subsidiary of Gulf Oil, is drilling the first deep test ever attempted in British Honduras in an effort to bring in the first Central American production below Mexico's Isthmus oil fields.

The test, projected to 10,000 ft., was spudded June 20 by Santa Fe Overseas Drilling Co. in the Yalbac area about 65 miles west of Belize. The contractor is using a National 55 rig.

The test follows more than 3 years exploration work in British Honduras conducted by Gulf. Ford Young, manager of the Honduras subsidiary, owns the exploration concession for the entire 12,000 sq. miles in the Central American country.

Before the rig could be moved into the jungle area, the company had to build a road and ferries for several streams that rise as much as 20 ft. during the spring rainy season. The rig and equipment were barged ashore and then transported overland to the drill site by truck-pulled athey wagons.

New Pay in Israel

Second producing sand hit at nation's initial well

ISRAEL'S first oil discovery well has encountered a second producing formation only 40 ft. below the 7-ft. sand at 4,906 ft. which tested about 50 bbl. an hour.

Lapidoth Israel Oil Co. and Israel Oil Prospectors, Ltd. are partners in the drilling venture only 6 miles from the Gaza strip. They said last week they have already penetrated 16 ft. of the new section and are still drilling. Crude obtained from this new section was described as of better quality than the 30°-gravity crude from the upper pay.

The important strike was made September 22 after the operators deepened a 3,400-ft. hole abandoned by Iraq Petroleum Co., Ltd. in 1948 when Arab-Israeli hostilities broke out. The well is at Huleiqat, which the Israeli's now call Heletz *(The Oil and Gas Journal, October 3, page 96)*.

Venezuela Postings Revised

Cie. Shell de Venezuela, Ltd., last week revised its price postings on two Venezuelan crudes and served notice that present postings on the third are for current delivery only. The changes generally are in line with postings previously made by Mene Grande Oil Co. and Creole Petroleum Corp.

Shell posted a new price of $2.67 a bbl. f.o.b. Puerto La Cruz for its 32.0-34.4-gravity Oficina crude. A 2½-cent differential was listed for each half-degree variation up or down. This crude was posted at $2.82 a bbl. by Shell in August.

The company boosted its prices 10 cents a bbl. to $2.55 for Lagomar, Shell's new Lake Maracaibo crude. At the same time it increased the gravity range to 31.0-31.4 degrees. This crude previously was posted as 29.0-29.4-gravity.

Shell is selling Lagunillas crude for $1.90 bbl. flat for current deliveries only. The company served notice last week the price will be $2.05 after January 1.

Cuban Play Hotter

Exploration will increase as hurricane season ends

EXPLORATION in Cuba will snap out of the doldrums next month as the wet and turbulent hurricane season blows out.

Stanolind Oil & Gas Co. will launch the largest oil search in the island's history. The Tulsa company will begin geophysical work around November 1 on a 12,000,000-acre concession in which it is earning half interest with two Cuban firms.

Siboney Development & Exploration Co. (Crescent Corp. and Sterling Oil, Tulsa) expects to complete boundary surveys within a month and start exploring its 5,200,000-acre concession. The initial test in a $2,000,000 program should be spudded in later this fall, probably in Camaguey Province.

Stanolind has contracted with Western Geophysical Co. International, Los Angeles, for two seismograph crews to start shooting early next month. One will work the island proper. The other will concentrate on the shallow offshore portion, which constitutes most of Stanolind's acreage.

Four parties will be put in the field next month mapping surface geology. Stanolind, producing subsidiary of Standard Oil Co. (Ind.), also plans aerial photography and airborne magnetometer surveys.

Progress of this work will determine how soon Stanolind stakes the first location in its 5-year, $10,000,000 search for oil *(The Oil and Gas Journal, September 12, page 98)*.

The current exploration boom, sparked by discovery of a single small field near Jatibonico, Camaguey, May 1, 1954, covers the 28,000,000-acre island as well as several million acres offshore *(The Oil and Gas Journal, August 22, page 89)*. Jatibonico is producing 1,100 bbl. per day from around 1,100 ft. in the Upper Cretaceous. Attention now is concentrated on thick Tertiary basins along the south coast. Many geologists believe these basins hold the key to Cuba's oil future.

Petrofina Eyes Germany

The Belgian company, Cie. Financiere Belge Des Petroles, S. A. (Petrofina) plans to enter the marketing field in West Germany if it can get government permission.

As part of the arrangement, Petrofina would buy 75 per cent interest in Ruhrbau GmbH. from Bayer interests. Ruhrbau owns a 6,500-bbl. daily refinery at Muelheim, near Cologne.

Although small in comparison with the major international oil companies, Petrofina is active and expanding in many quarters. It holds controlling interest in refining, marketing, and tanker companies operating in Europe, Africa, Canada, and Mexico. It recently acquired a minority interest in International Egyptian Oil Co., Inc., which is developing production in Sinai Peninsula of Egypt.

Russia Expanding New Field

Russia has reported fast progress in developing its new Shkapovo field in the Bashkir Autonomous Republic.

The newspaper Pravda says that a pipeline into the area has been completed, the first four producing wells are in operation, and that several more wells will soon be in production. Pravda claims that Shkapovo has reserves equal to those of Tuimaza, the Bashkir field which is widely regarded as one of the richest finds in the entire "Second Baku."

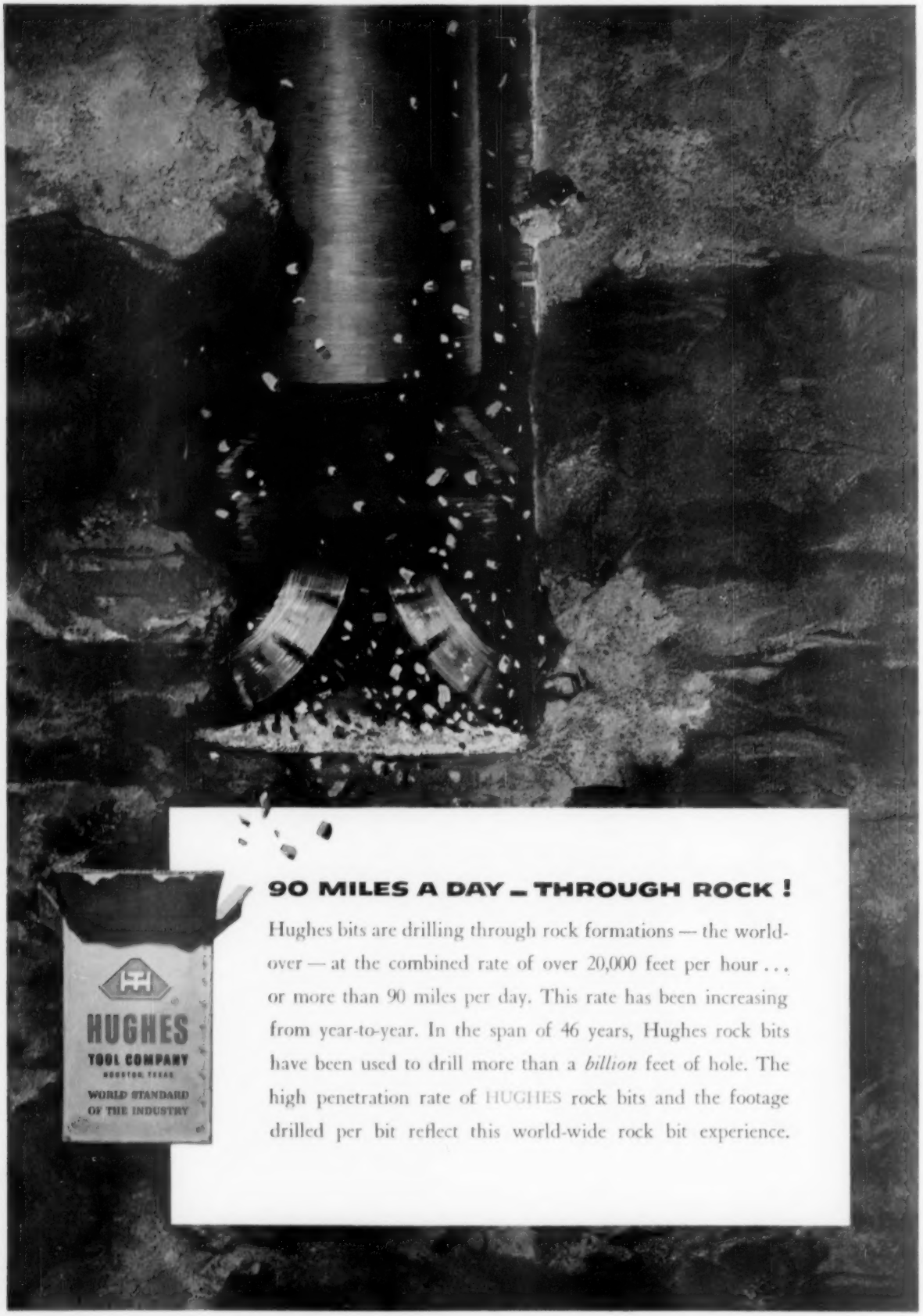
International Briefs

Esso Petroleum Co., Ltd. (Standard Oil Co. of New Jersey), is spending about $2,800,000 expanding its research laboratories near Abingdon, England. C. S. Windebank, managing director of Esso Development Co., Ltd., says the expansion will include new engine testing, analytical, inspection, and research laboratories in addition to new office buildings.

The Iranian Government has ordered two 32,500-ton tankers to be built in Rotterdam shipyards. The two new vessels are a part of Iran's plan to build and operate a tanker fleet.

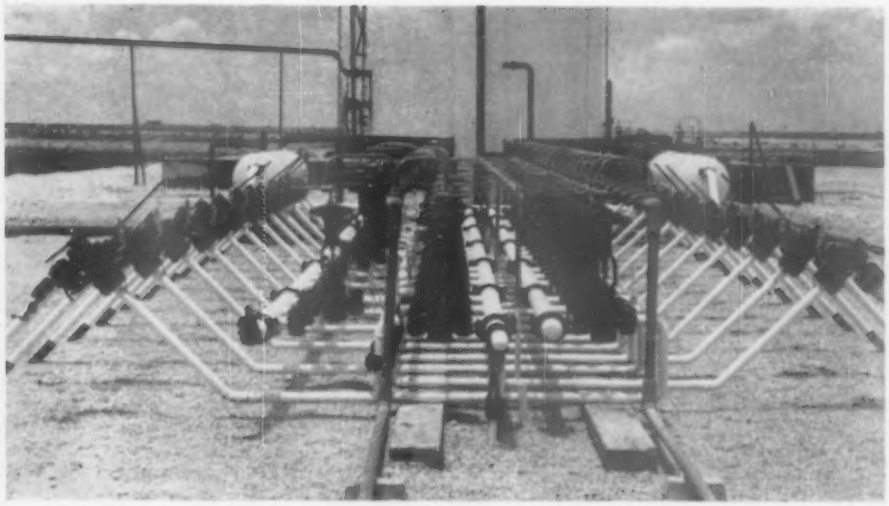
The first synthetic-glycerin plant to be built outside the United States will go up at the Pernis refinery operated near Rotterdam by N.V. De Bataafsche Petroleum Maatschappij (Royal Dutch-Shell).

Bit for bit, regular or jet, you will find that *consistently*—day-after-day—you get faster penetration and more hole per bit with Hughes bits. The superior performance of Hughes bits has been proved in hundreds of thousands of wells—not just a hand-picked few—and in the drilling of more than a billion feet of hole throughout the world. HUGHES bits enable you to get your well down in the shortest possible time... and to take *full* advantage of new drilling techniques.



90 MILES A DAY — THROUGH ROCK !

Hughes bits are drilling through rock formations — the world-over — at the combined rate of over 20,000 feet per hour . . . or more than 90 miles per day. This rate has been increasing from year-to-year. In the span of 46 years, Hughes rock bits have been used to drill more than a *billion* feet of hole. The high penetration rate of HUGHES rock bits and the footage drilled per bit reflect this world-wide rock bit experience.



SHELL'S first automatic installation used two high-pressure valves per well. Fig. 1.

"These techniques move production a step closer to full automation."

The Editors.

How Shell Designs an Automatic Lease

. . . and makes it work to save time and money in a West Texas field

SHELL entered the field of automatic production several years ago with pilot tests in the Midland, Tex., area.

Preliminary time-and-motion studies showed that the average lease switcher or pumper spends one-third of his time driving from point to point on the lease. The remainder of his time is largely spent turning wells on and off, switching tanks, gaging tanks, and witnessing pipeline gager measurements. These things can be easily duplicated by automatic devices and instruments.

Following these studies, a pilot installation was made which contained the most recent automatic devices. This pilot installation consisted of: (1) time-cycle controls from a central point for five flowing wells; (2) automatic tank filling and emptying to measure gross oil volumes; (3) instruments to record the physical properties of the crude oil; and (4) safety devices to shut in the wells in the event of a power failure or malfunction of equipment.

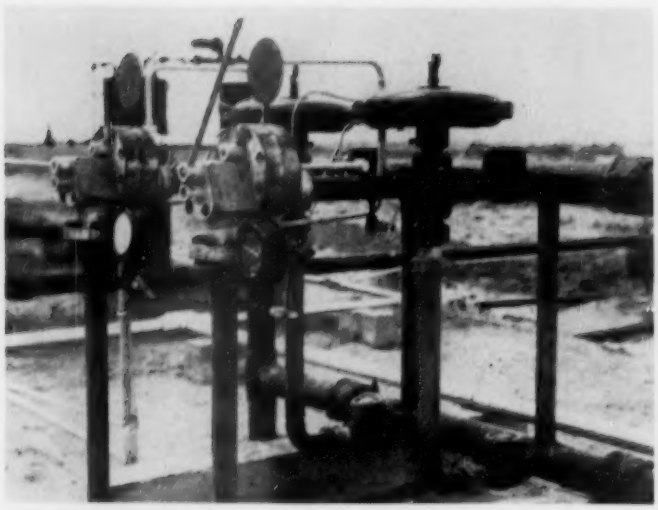
The favorable results that this pilot installation produced prompted Shell to use automatic equipment in full lease operations. These operations, outlined in this article, have proved so successful that Shell is now equipping an entire field with these automatic controls.

by D. C. Meyers
Shell Oil Co., Midland, Tex.

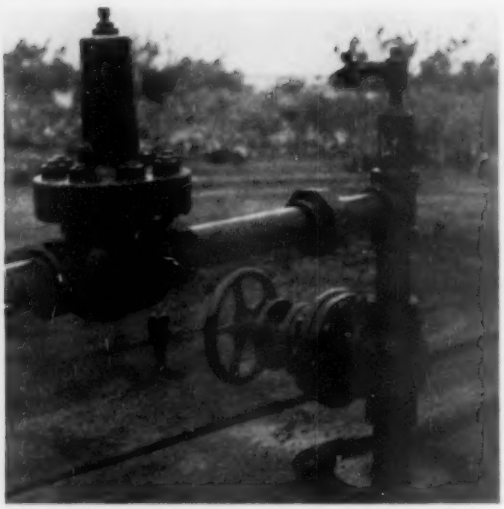
AN extensive economic study of savings and benefits which could be realized by utilizing new production techniques and automatic control equipment on a field-wide basis was made of Shell-operated leases in Wasson field, Yoakum County, Texas. Included in the economic study was fully automatic well testing and data recording—work that consumes quite a bit of a lease switcher's time.

A design for a completely automatic lease was made which incorporated the best features of previous installations as well as many new and original ideas which more or less evolved as the design problem was attacked. Based on this design, it was estimated that the time required to operate a lease might be reduced as much as 85 per cent, which would greatly increase the productivity of each lease switcher.

This design changed a number of conventional operating practices in order to reduce the cost of the fully automatic lease installation. Some of these changes were: (1) a single, centrally located tank battery to serve up to 640 acres or more; (2) well chokes located at the central tank-battery well manifold; (3) wells controlled at the battery manifold; and (4) only one tank per lease to be used for metering oil



NOW, Shell uses a single three-way, three-position valve in each well. This type was especially designed for the job. Fig. 2.



THIS wellhead safety valve shuts in the well whenever flow exceeds a preset rate. Fig. 3.

into the pipe line, with a surge tank to provide additional storage facilities.

1. What It Does

The lease controls were designed to perform automatically the following operations, which had previously been done manually:

1. Flow each well on a predetermined time schedule plus intermitting during flow period if desirable.

2. Shut in wells at the wellhead in the event of a parted flow line.

3. Test each well once each month (or more often, if desired) and record well number, length of test period, length of flow period(s), unit volumes of produced fluid, and gas—all on a single chart.

4. Route oil from well through battery, including testing and treating facilities, and into the pipeline.

5. Meter predetermined gross volumes of fluid to the pipeline by means of a metering tank.

6. Measure and record physical properties of the fluid (temperature, gravity, and b.s. and w.) prior to delivery to the pipeline.

7. Prevent "bad oil" (1 per cent or more b.s. and w.) from entering the metering tank by continuous monitoring during the filling cycle.

8. Prevent the buildup of tank "bottoms" by removing bottoms once each filling-running cycle of the metering tank.

9. Recover the merchantable oil from tank "bottoms" by circulating through the treating system.

10. Shut in the lease after a predetermined number of tanks have been run to the pipeline to prevent overproducing daily and monthly scheduled allowable.

11. Prevent loss of oil due to malfunction of equipment by shutting in wells.

12. Shut in wells in the event of electric or pneumatic power failure.

Construction of the first lease embodying the above features was begun several years ago. A total of 12 leases are now in automatic operation in Wasson field, but properties-measuring instruments have been installed only on the first lease since this phase is still experimental and automatic custody transfer has not as yet been accepted.

An additional seven leases are under construction with nine more lease installations planned for the latter part of 1955 to complete this field-wide program. Upon completion of the program, the number of tank batteries serving the leases will have been reduced from 62 to 28.

2. Equipment Details

Each well is flowed or pumped according to a preset schedule, both as to time of day and days of week. Each well is provided with a separate 24-hour time clock which may be set to produce the well either intermittently or continuously for periods from 15 to 24 hours. A skip-a-day feature permits the well to be shut in one or more days each week. Special timers are provided where intermitter frequency is less than 15 minutes.

A pneumatic motor valve with an electric pilot, actuated by means of the time clock, is located in each flow line where it enters the well manifold at the tank batteries. The well choke to control flow rate is also located at the manifold. Full shut-in and flowing pressures are carried in the flow lines up to the lease manifold. A safety valve located at the wellhead shuts in the well should the flow line rupture or be parted accidently.

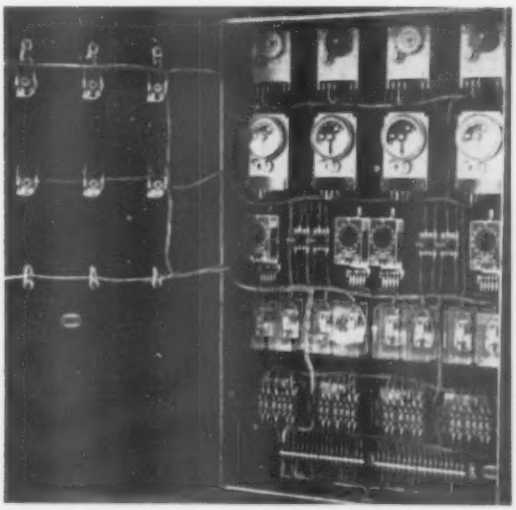
On the 12 leases now in operation, these safety valves depended on low pressure to cause the well to be shut in. This method did not prove entirely satisfactory because a number of the wells, being opened up, dropped in pressure below the set minimum. This caused the wells to be shut in, and in some cases killed a well, which then required swabbing to "kick off."

On leases now under construction, the safety valve is actuated by above-normal flow rates, and is independent of pressure. Only 3-psi. differential is necessary to trip the valve, which may be adjusted over a wide range. The valve remains closed until the difficulty which caused the valve to close is corrected and it is manually reset. Fig. 3 shows a wellhead safety valve which is actuated by excess flow.

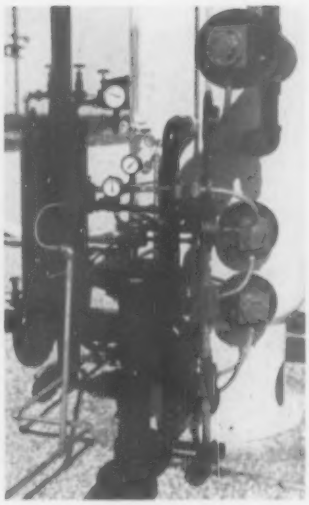
Figs. 1 and 2 show two of the three header designs which have been used. Fig. 1 shows the header design used on the earlier installations. It utilized two separate high-pressure valves to shut in the flow lines and divert flow from the normal production manifold into the test manifold.

In a later automatic lease installation, a single high-pressure valve was used to shut in the well flow and a low-pressure three-way valve to divert flow into production or test manifolds. The most recent and most economical design is shown in Fig. 2 where a specially designed high-pressure three-way valve not only diverts flow into the proper manifold but also shuts in the well.

As mentioned previously, automatic well testing is also incorporated into



PANELS like this one are used to control well flow and to test individual wells through an intricate control hookup. Each panel controls four wells. Fig. 4.



CLOSEOFF valves and float switches here are used on a specially designed metering separator. Fig. 5.

BELLOWS-TYPE differential and electrical transmitters of differential and static pressures. Fig. 6.

the lease design. Fig. 4 shows a control panel used to control the well flow and test periods of four individual wells. A manually set timer is used to govern the length of well test. Under normal conditions each well is tested over a 24-hour period at the same flowing conditions (choke size, flowing schedule, intermitter frequency, etc.) as in normal production. Special tests are possible by means of a selector switch for automatic or manual operations.

Each well is tested in sequence. That is, when a test on one well is completed, the test on the next well to be tested is begun automatically—and so on down the line until the last well is tested. Testing is not begun again until the well-test timers have been manually reset.

Fig. 5 shows the specially designed metering separator used for testing the wells. Drawing 1 shows a diagrammatic sketch of the vessel which meters by means of positive two-barrel increments. The meter is, as the name implies, a combination of a separator and a volume tank used to meter total production. Fluid enters the top section of the vessel from the test manifold. A solid partition separates the separator section from the meter section. Fluid flows by gravity from the upper section into the lower section by means of an external line containing a shut-off valve.

When the level in the metering section reaches the upper float switch, the valve in the line between the upper and lower sections closes and the valve in the line from the metering section to the storage tank opens. When the level in the metering section is lowered about to the point where the cross-sectional area begins to be reduced, the outlet valve is throttled to an almost closed position. This limits the rate of level change until the level reaches the bottom float switch. When it does, the outlet valve closes completely and the inlet valve again opens, starting a new metering cycle.

Float design reduces errors. An emergency float switch located in the separator section automatically switches the well on test back into the production manifold and stops the test should either separator valve fail to operate.

3. Gas Metering

The gas from the well on test is metered by an electrically operated gas meter. This meter automatically and continuously integrates and totalizes the gas flow in units of volume corrected to base conditions and compensated for varying pressures.

Three types of electric gas meters have been installed and are undergoing tests. One of the types under test is shown in Figs. 6 and 7. Fig. 6 shows the bellows-type differential primary element and the electrical transmitter for differential and static pressure valves. Fig. 7 is a view of the receiver containing the flow-rate recorder, the electro-mechanical integrator, and the totalizer.

Well-test data are recorded on a multipen operations recorder which receives electrical impulses from the metering separator and the electric gas meter. The type of recorder used is shown in Fig. 8. The recorder chart speed is uniform and it is possible to analyze the test record to determine not only the volume of total fluid, total gas, and total water, but also ratios of oil and gas or oil and water for any volume unit during the test.

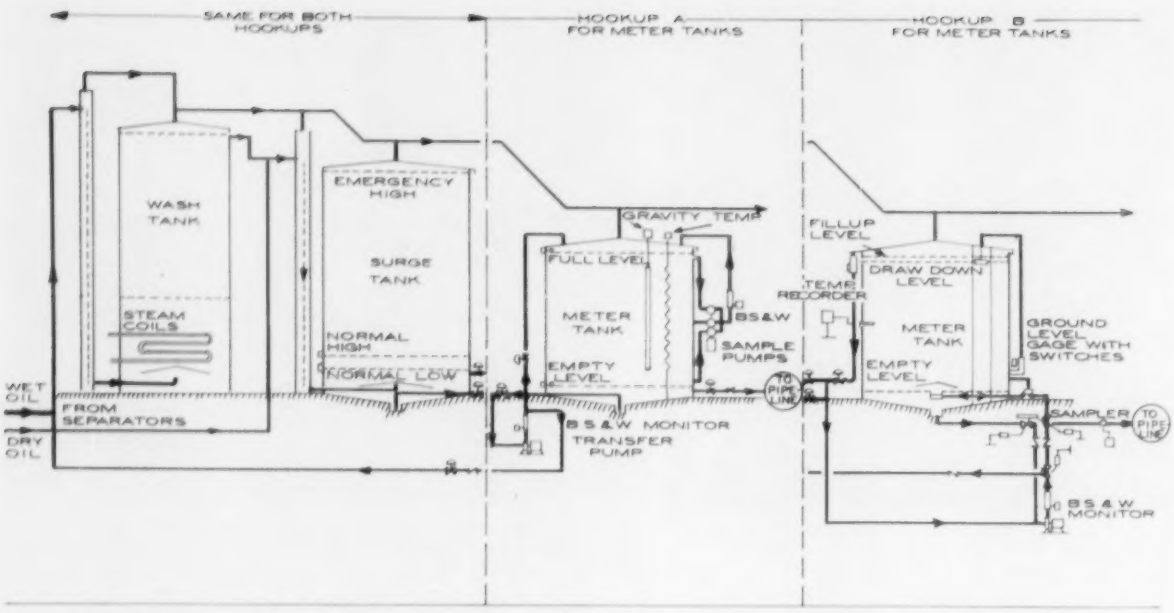
This information is most helpful in controlling gas-oil and water-oil ratios by means of choke sizes and length-of-flow periods. A well code device causes each well on test to be identified at the start of its test period regardless of the sequence of the well-test program.

Fig. 10 shows the separators serving leases which produce both clean oil and oil containing water. The metering separator used for automatically testing individual wells is the vertical vessel in the center. The two horizontal separators are used for normal production. On leases where the wells produce only clean oil or on leases where all wells produce oil containing water, only one horizontal separator is used. Fluid discharged from the metering separator is commingled automatically with that from either of the separators, depending on whether the well on test produces clean or "dirty" oil.

In a typical automatic tank battery for a lease producing both clean and dirty oil, there is a slender tank serving as a heated settling or wash tank. This is used for dehydrating the produced oil containing water. Steam coils in the tank and an external, low-pressure, gas-fired steam generator are used to provide the necessary heat for treating the oil-water emulsion.

The battery has a surge tank, which is necessary to permit continued production while the metering tank is being run to the pipeline or is temporarily out of service. Oil from wells producing no water is produced directly into the surge tank, bypassing the wash tank.

The third tank in the battery is the one used for metering lease production



DRAWING 2—A typical tank battery (with hookup A) and the revised arrangement (with hookup B) now being installed.

to the pipeline. The size of these tanks depends on the amount of production to be handled from each lease. At the present time, the surge-tank capacity is usually twice the daily allowable, while the metering-tank capacity is about 1½ times the daily allowable to permit manual gaging and running roughly every other day.

When custody transfer of oil automatically becomes permissible, the size of the metering tank may be reduced considerably, because many tank runs may be made each day rather than one every other day. For the same reason, the size of the surge tank could also be reduced if desired.

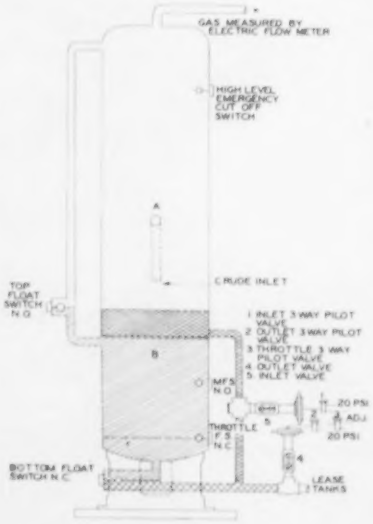
4. Tank Batteries

Following is a description of the manner in which the presently operating tank batteries function. Drawing 2-A shows a diagrammatic sketch of a typical tank battery.

Oil containing water goes from the wet-oil separator to the wash tank where the water is removed and the dehydrated oil enters the flume of the surge tank. Clean oil goes from the clean-oil separator to the surge-tank flume. There, gas liberated due to the drop in pressure is removed prior to its entry into the surge tank. The oil enters the surge tank through a spreader below the normal low level to reduce disturbing the bottoms in the tank and to permit some settling out of b.s. and w. from the "clean" oil.

An electric motor-driven pump is used to transfer oil from the surge tank to the metering tank. Float switches in the surge tank cause the transfer pump to start and stop in order to maintain the level in the surge tank between normal limits, as shown on the sketch, when the metering tank is being filled.

An electronic instrument used for measuring b.s. and w. content of the oil is located on the discharge side of transfer pump and monitors all oil transferred. Should the b.s. and w. content of oil being pumped into the metering tank exceed a preset amount, the inlet to the run tank is closed and a bypass line opened so that the oil is pumped back through the treating system. When the b.s. and w. content drops



DRAWING 1—This vessel meters by means of positive 2-bbl. increments.

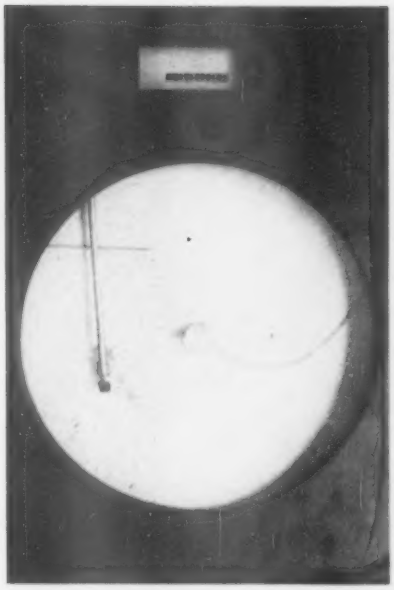
below the preset amount, oil is again pumped into the metering tank.

In the event that the b.s. and w. content remains high, the circulation continues through the treating system. If this is not corrected, the surge tank will become full, actuating an emergency float switch which causes all wells on the lease to be shut in.

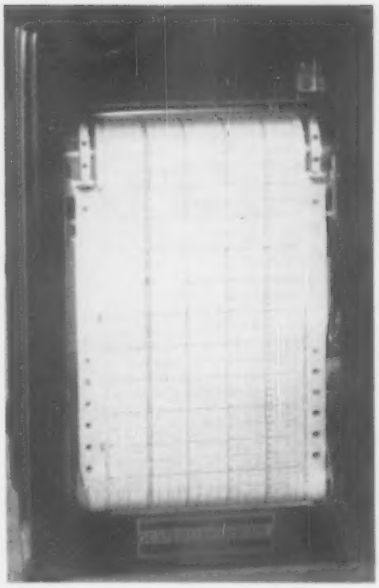
When the metering tank fills to a predetermined level, a float switch is actuated which stops the filling cycle and starts a timer. This permits the desired physical properties of the crude to be measured and recorded on a single strip chart for a preset period of time. A more complete description of these measurement and recording instruments is given later.

Fig. 9 shows the recording instrument used both for monitoring the b.s. and w. content of the oil as it enters the metering tank and for measuring the b.s. and w. content of the oil in the tank prior to its delivery to the pipeline. The strip chart is used to record the physical properties of the oil before delivery (temperature, A.P.I. gravity, and per cent b.s. and w.). While the oil properties are being measured and recorded, bottoms from the surge tank are pumped out and circulated through the treating systems for a preset length of time.

Upon completion of the measurement and recording of the physical properties of the oil in the metering tank, the valve in the outlet to the pipeline is opened. This, if oil was run automatically, would run the tank of oil to the pipeline. Since the transfer of the oil custody must still be done manually, a manually operated



ELECTRONIC continuous integrating gas meter used for individual well testing. Fig. 7.



ELECTRICAL operations recorder used for individual well-test data. Fig. 8.

RECORDING instruments for detailing crude properties like A.P.I. gravity. Fig. 9.

valve in the outlet is not opened until the tank is gaged and properties measured in the conventional manner. When, during running, the oil level in the metering tank has been lowered to a predetermined point, a float switch is actuated to close automatic outlet valves.

Since the transfer of oil custody is still manual, it is necessary that the ending gage be done manually and the manual valve closed before continuing the metering cycle. When the manual valve is closed, a switch connected to it actuates a timer to give the pipeline gager time to make his ending gage before the metering cycle is continued.

Upon completion of the time interval, the "bottoms" in the metering tank are pumped out and through the treating system to reduce the possibility of having "bottoms" build up in this tank. After pumping out the metering-tank bottoms, oil is pumped from the surge tank into the metering tank to begin another metering cycle.

In determining and recording oil properties, the temperature of oil in the metering tank is measured by means of an averaging electrical-resistance element suspended from the deck of the metering tank. The electrical signal, proportional to the temperature of the oil, is fed into a bridge circuit of the properties recorder.

A.P.I. gravity is measured by means of a float submerged in the oil in the metering tank. The buoyant force acting on the float, proportional to the density of the oil, is converted into a pneumatic signal. This in turn is converted into an electrical signal and fed into a bridge circuit of the properties recorder.

B.s. and w. content is measured by means of a capacitance measuring instrument which measures the capacitance of a condenser, with the oil to be measured acting as the dielectric between the plates of the condenser.

Since the dielectric properties of oil and water differ considerably, and knowing the dielectric properties of the oil and water, it is possible to translate the capacitance measured by the instrument into percentage of water in the oil. Since the dielectric property of oil is affected by temperature, a temperature-sensing element and a compensating circuit are provided to correct the apparent measurement of capacitance to that which it would be at a desired base temperature. The measurement of capacitance is converted into an electrical signal which is fed to a bridge circuit of the properties recorder.

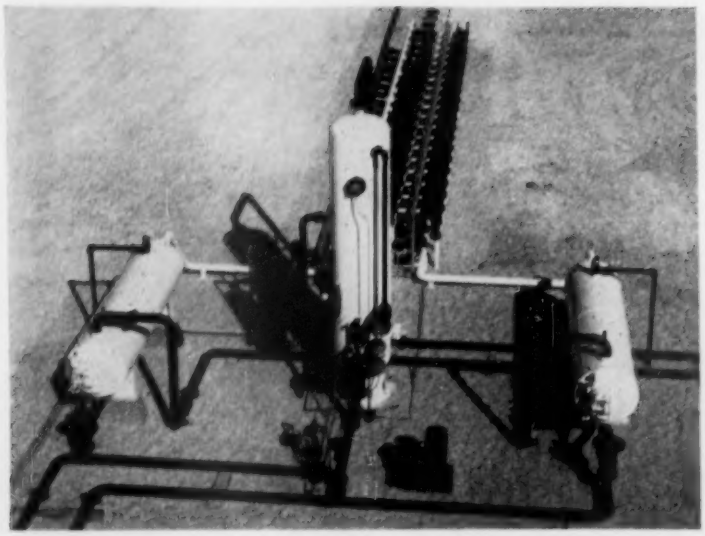
The b.s. and w. content of the oil being transferred into the metering tank is monitored by means of a condenser or capacitance cell inserted into the discharge line of the transfer pump. Should the capacitance of this condenser or probe exceed that corresponding to the desired maximum percentage of water, a switch is actuated by the measuring instrument to close the metering-tank fill valve and open a circulating valve to the treating system.

The b.s. and w. content of oil in the metering tank is determined by means of a condenser or capacitance cell in a sample line. Three gear pumps, operated from the same electric motor, pump samples of oil from three levels (top, middle, and bottom) in the metering tank into the sample line containing the capacitance cell and then back into the metering tank. One capacitance measuring instrument is used for both the monitoring and sampling cells, with a relay being used to switch from one to the other. Extensive laboratory tests, as well as field tests, have indicated that this instrument is considerably more accurate in determining percentage of water in oil than the conventional centrifuge method.

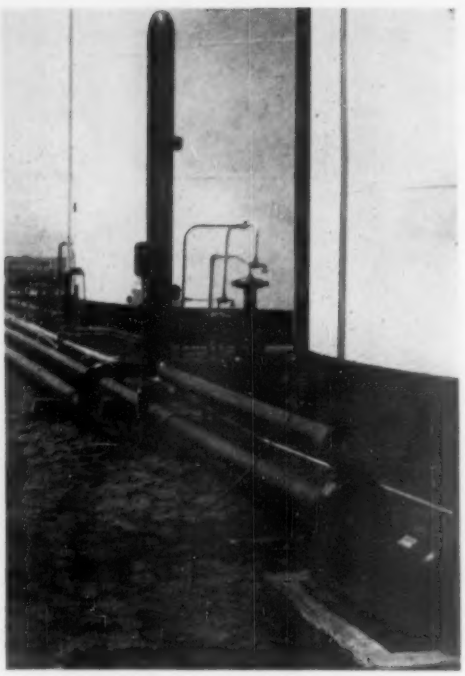
Laboratory tests have indicated that this instrument is not measurably affected by normal fluctuations in power voltages, salinity of water, aging of electronic equipment (except complete failure), or conductivity of the fluid. The instrument is very easily calibrated by means of standard built-in precision condensers. Adjustment of either the span or zero setting will not affect the other setting. Accuracy of the capacitance-measuring instrument alone is 1 per cent of full scale, which is equivalent to .03 per cent water. Due to variations of the dielectric properties

ABOUT THE AUTHOR

D. C. Meyers is division mechanical engineer at Hobbs, N. M., for Shell Oil Co. He joined Shell in 1946 after graduating from the University of Missouri with a degree in mechanical engineering. His first job was junior engineer at Kilgore, Tex. He later served as an engineer at Midland, Tex., Lake Charles, Black Bayou, and Donaldsonville, La., and Tulsa. He was area development engineer at Midland from 1950 until his transfer to Hobbs early this year.



SEPARATORS like that above are used on a lease which produce both clean and dirty oil. The metering separator is in the center. Fig. 10.



AT RIGHT are the piping, valves, transfer pump, and b.s. and w. monitoring cell (center) installed on the first automatic tank battery. Fig. 11.

of the crude oil being measured and errors introduced by the probe and connecting cables, the over-all accuracy of the system has proved to be in the order of 1/10 of 1 per cent water.

Fig. 11 is a view of the piping, valves, transfer pump, and b.s. and w. cell used to monitor the oil entering the metering tank. Fig. 12 shows the cell used in the metering tank sampling line.

The oil properties are recorded on a multiple-record electronic 11-in. strip-chart recorder which uses three separate bridge balancing circuits—one for each of the variables recorded. Each separate record is printed in a different-colored ink and identified by printed numbers. The chart drive is energized only during the properties-measurement interval.

5. Pipeline Transfer

After the batteries described above were installed, discussions were held with a number of men from various pipeline and producing companies. All of these people were interested in automatic custody transfer. They were asked to suggest which features should be incorporated into any new tank-battery designs so as to make them acceptable for that purpose. The following is a description of the tank batteries now being installed by Shell on a number of leases in Wasson field. This revised design includes all features suggested during the above discussions. Among them are:

1. Top and bottom metering levels are to be controlled by spillover or weir boxes containing float switches to provide a positive means of controlling the levels.

2. The metering-tank fill, drain, and pipeline outlet lines are to be equipped with valves which are mechanically interlocked to prevent draining or producing into the tank while "on the line" or running oil to the pipeline while the tank is filling. Seals are to be provided on the interlocks to show evidence of tampering.

3. The temperature of the crude oil will be recorded immediately prior to running.

4. Uniform sample volumes will be taken from each tank run and stored in a pressurized vessel for later tests of a composite sample for b.s. and w. content and gravity.

5. Two independent checks on the number of tanks run will be recorded. One will use an electrical counter, while the second will consist of a pressure-gage record of the oil-level changes.

6. Plug valves with automatic pneumatic operators will be used on the metering-tank fill, drain, and pipeline outlet lines to reduce the possibility of leakage.

7. Sample cocks will be located around the metering-tank bottom to permit periodic checks on the bottoms buildup.

8. Automatic preset electrical counters and adjustable program clocks will provide means for the pipeline receiving the oil to limit the number of tanks run during any time period (day and month) and to schedule running periods during each day as well as week.

9. Electrical controls will be contained in a housing provided with locks as well as seals to prevent tampering with the electrical control circuits.

Drawing 2-B shows a diagrammatic sketch of this tank-battery design. The wash tank and surge tank are the same as those described earlier, except for the use of float-operated ground-level automatic tank gages equipped with auxiliary switches. These switches replace the float switches used to start and stop the transfer pump during metering-tank filling operations.

6. Automatic Metering

In the operation of this tank-battery design, the metering tank is filled by means of the transfer pump taking suction from the surge tank as in the original design. Immediately downstream from the transfer-pump discharge, a three-way pneumatically operated plug valve is located. It is positioned to divert flow from the pump back through the treating system, except during the metering-tank filling operations.

While filling, the flow-diverting valve directs the oil to the metering tank through a line which is connected to another pneumatically operated three-way plug valve. This latter three-way valve is positioned to direct the flow either from the pump into the metering tank or from the metering tank into the pipeline connection. Thus the flow cannot be into and out of the tank

THIS EQUIPMENT is used for measuring b.s. and w. content of crude in the metering tank. Note the probes, pumps, and sampling cell (center). Fig. 12.

"The results which have been attained so far at Wasson indicate that large-scale field-wide operation of automatic lease equipment is entirely feasible. Further installations are planned, and by early next year—except for two or three small tracts—all Shell leases in Wasson field will be equipped for automatic operation."

simultaneously. The electropneumatic pilots will stop flow either into or out of the metering tank should there be a failure of either electrical or pneumatic power. And it will return the valves to their original positions upon return of power.

The metering tank fills through the two three-way valves until a predetermined level is reached. This causes the float-operated ground-level automatic gage to actuate a switch which stops the pump, shuts the outlet valve from the surge tank, and repositions the pump-discharge diverting valve to close off the line to the tank. The three-way valve at the tank inlet-outlet remains in the fill position.

During tests of this design and until there is acceptance of automatic custody transfer, the tank will remain in this position until a manual switch is actuated. An overflow or weir box is positioned with its fill line set below the normal high filling level in the metering tank.

Upon reaching the high level in the tank (and after the manual switch is actuated), a valve in the drain line from the weir box is opened and the transfer pump is started. This draws down the level in the meter tank until the weir-level point is reached. Continued pumping causes the level in the weir box to drop until a float switch is actuated, which will stop the pump and close the weir-box drain valve.

Since the rate of withdrawal from the weir box is faster than the inflow rate when the head above the weir-box entry is small, a reset timer is started as soon as the weir-box float switch is actuated. Should the level in the weir box rise above the level which actuated the float switch due to the continued inflow of fluid, the weir box drain is reopened and pump restarted to lower the level again. This is continued until the level in the weir box does not rise, after the pump is stopped, for a preset time interval.

On completion of the drawdown operation, another timer starts. This causes the temperature of the oil in the meter tank to be recorded (or, for fully automatic future operations, the physical properties of the oil to be measured and recorded). If desired, a small representative sample may be pumped from the tank into a sample vessel. During this timing interval, the "bottoms" from the surge tank are pumped out and through the treating systems for removal of b.s. and w. which might have been settled out.

When recording of the temperature or physical properties has been completed, the three-way plug valve in the tank inlet-outlet line is positioned so that the oil can flow from the meter tank into the pipeline connection. A sampler, taking periodic samples from the line and regulated by the rate of flow, may be located in the pipeline outlet line. The samples would be stored in a pressurized vessel.

An overflow or weir box is also located in the bottom portion of the metering tank with its top level at the desired lower gaging level. The oil is run to the pipeline through this weir box. When the level in the meter tank is lowered to the overflow level of this lower weir box, further flow to the pipeline causes the level in the weir box to continue to drop until a float switch is actuated. This switch causes the three-way plug valve to be repositioned to close off the pipeline connection.

A reset timer is also started and, should the level in the weir box rise due to continued inflow from the tank as explained previously, the pipeline connection is reopened to relower the level in the weir box. This operation is continued until there is no increase in the level in the weir box for the preset time desired.

Until the tank battery can operate to the pipeline automatically, the metering cycle stops at this point until a manual switch is actuated after manually taking the ending gage.

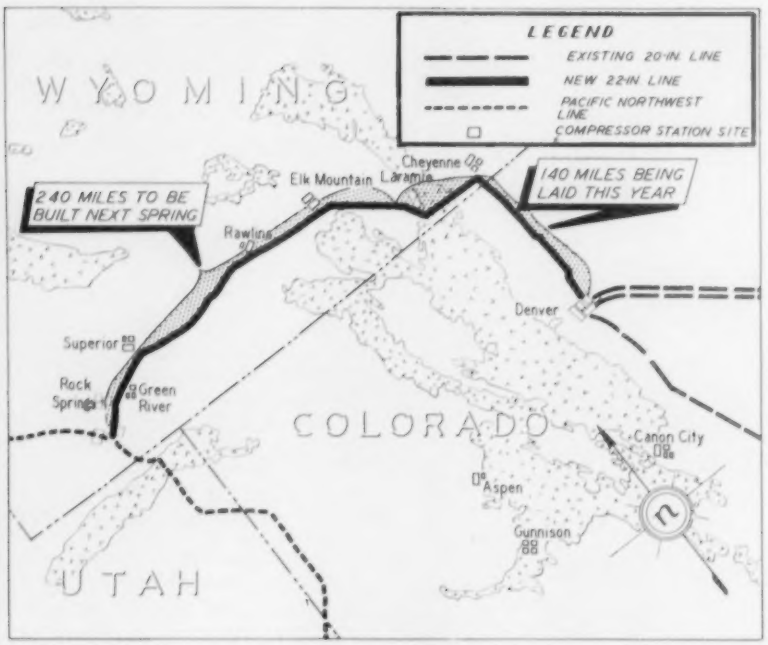
7. Bottoms Recycling

Upon completion of the pipeline run and actuation of the manual switch, the metering-tank drain valve is opened and the transfer pump is started to pump out the "bottoms" through the treating system. A mechanical linkage physically prevents the opening of the drain valve when the oil is being run to the pipeline. When the "bottoms" drainoff is completed, the drain valve closes, the outlet valve from the surge tank is opened, and the pump discharge three-way diverting valve is positioned so that the oil is pumped from the surge tank into the metering tank to begin another metering cycle. An independent emergency high-level float switch stops the transfer pump should the level in the metering tank exceed the normal fill-up level.

The number of metering cycles are recorded by means of an electrical counter which may be set to limit the number of cycles during the day, week, and month to prevent running more than the lease allowable. A clock-type program timer may be set to restrict the flow of oil to the pipeline to certain hours of the day and also days of the week. A level recorder will be used as a check against the electrical counter for the number of metering cycles run and to insure that full tanks are run each metering cycle.

The results which have been attained so far at Wasson indicate that large-scale field-wide operation of automatic lease equipment is entirely feasible. Further installations are planned and by early next year, except for two or three small tracts, all Shell leases in Wasson field will be equipped for automatic operation. With the eventual acceptance of automatic custody transfer, it will then be possible to take full advantage of increased efficiency of both methods and personnel.

PIPE STRINGING on the Colorado Interstate 22-in. across the plains of southern Wyoming.



ROUTE of Colorado Interstate's new 22-in. line which will connect with Pacific Northwest near Green River, Wyo.

Colorado Interstate construction demonstrates how

Four Techniques Insure a Better Pipeline

(1) Higher-strength pipe, (2) more care in coating, (3) deeper ditch, (4) high percentage of weld X-rays

by Robert G. Deering

SOME unusual practices in design and construction are features of the 140-mile, 22-in. gas pipeline being laid this year by Colorado Interstate Gas Co. A strong, light-wall pipe is being used; ditch is extra deep, casings will be vented from the bottom—these innovations and several of lesser consequence will be of interest to pipeline designers and builders alike.

This new link in Colorado Interstate's system will be reversible. This year gas will be supplied to the line from the Denver end. Next year, another 240 miles of 22-in. will be laid from Laramie to Green River, Wyo. Here it will connect with Pacific Northwest Pipeline Corp.'s line and flow will be reversed to send gas into the Denver area.

This year Houston Contracting Co. is laying the first section of the line from Laramie to Denver. One spread is being used with M. L. (Whitey) Thompson as spread man. Bill Lynch is chief inspector for Colorado Interstate.

Design features . . . Pipe for the line is A.P.I. Grade X-52 with minimum yield of 52,000 psi. and minimum tensile strength of 72,000 psi.

All pipe is mill beveled to 30°. The X-52 is ¼-in.-wall pipe. A small amount ⅜-in.-wall Grade X-46 pipe will be used for all road and railroad crossings.

Colorado Interstate is going to a deeper ditch for this line than in any of its previous programs. Normal coverage will be 44 in. for cultivated land, 40 in. through pasture land, and 24 in. for rock. This deeper coverage will provide some protection against condensates forming in the extremely cold winters but the line still won't be below frost line. Mainly the extra coverage is for added protection against damage from construction work—road building, terracing, digging of shallow irrigation ditches, etc.

Vents . . . For the first time on Colorado Interstate's system, casings will be vented from the underneath side of the low end. The U-shaped vent pipe will come out of the bottom of the casing, curve back over the center of the line, then be extended above ground level.

Venting in this manner will allow condensed moisture to accumulate in the vent pipe at the low end of the casing. Then maintenance crews can

BENDING MACHINE at work. A little floor wax on the jaws kept the pipe from being marked.

PULLING IN a crossing. Interesting feature of crossings are vents made from bottom of casing.

COATING the 22-in. line. Both glass and felt were used and two crews checked coating for holidays.

FIELD BEVELING a damaged joint of pipe ahead of the line-up crew.

periodically blow water from the casing, using compressed air applied at the high-end vent pipe. Rubber insulating spacers are also being used at all cased crossings.

No particular pains are taken to see that one end of the casing is low. Any long boring job will always end up with a several-inch difference in elevation between ends. Longest crossing of the first 30-miles of this job was a crossing of a railroad dump carrying two main tracks. This crossing was about 200 ft. and had a drop of 2 ft. Thus, any condensed moisture will readily drain to the natural sump where it can be blown out.

All highway and railroad crossings are made with ⅜-in.-wall X-46 pipe and all welds in the crossings are radiographically inspected.

Coating . . . Two types of coating will be used on the line. Asphalt will be used through the mountains and pasture land of Wyoming. Coal-tar coating will be used in the irrigated farm lands north of Denver. Each coating is reinforced with glass-fiber wrap. In Wyoming where gravel was encountered an outside layer of 15-lb. felt is added. On the remainder of the pipeline through the pastures and fields of Colorado an 8-lb.-felt outer wrap is used.

All pipe will be line coated and placed back on skids alongside the ditch. Extra precautions are taken to see that the line going in the ditch is as free as possible of coating holidays. One jeeping and patching crew works just behind the coating machine. Later, when the lowering-in crew has patched skid marks, another holiday-detector crew checks the line again just before it goes in the ditch.

Inspection setup . . . Colorado Interstate has a seven-man inspection team on this job. Besides the chief inspector, two men are on welding, two on coating, one on lowering in and backfilling, and one on back-end work and clean-up. Also, two contract radiographic inspection teams are used.

Clearing and grading are no particular problem on this line. Little surface rock and no timber have to be dealt with. However, along with the extra-deep coverage, there is plenty of belowground rock to complicate the ditching problem. In the first 33 miles of line 8,500 yards of rock was shot. A good part of the rest of the line is in soil having a tightly packed gravel, making ditching slow.

Bending, welding . . . In early stages of the construction, marking of the pipe in the bending machine gave some trouble. But the bending crew came up with an ingenious solution. After trying ordinary greases and then graphite, the crew found that a well-known liquid floor wax did the job perfectly. So, before bending each joint, the bender operator paints a little wax on the bending jaws. Then the pipe comes out smooth and unmarked. Specs on the job called for a maximum bend of 11° per joint.

Houston Contracting is using two stringer-bead welders, four hot-pass welders, and seven men on the firing line. Progress has been very good, being

HARD-PACKED GRAVEL like this made ditching slow on a large part of the line.

NEW ELECTRICAL INSTRUMENT for checking coating thickness. Inspector can check coating all around pipe in a matter of seconds.

as high as 2.3 miles per day on one occasion.

One unusual aid to firing-line welders is being used. This is a plywood windshield about 4 by 6 ft. notched to fit the pipe. High winds on the Wyoming plains make it difficult to hold a good arc. Since the firing-line welders are in one place for some time they are making good use of this shield. Stringer and hot-pass welders are not using them.

Weld inspection . . . Two crews are making radiographic inspection of welds. One crew works principally on road and railroad crossings, checking every weld in the crossing. Another crew concentrates on the main-line welds. Quota for this latter crew is 30 per cent of all welds.

Source for the inspection is an X-ray tube which is placed outside the pipe. The type of device used requires that four shots be taken to get a complete picture of a weld, i.e., 90° of weld is taken with each shot.

Coating . . . Conventional practices are used in the coating crew. One side-boom tractor using a double cradle is able to handle the pipe for the coating machine.

To protect the coating from damage, the ditch is being divided into three classifications. In regular ditch—having no rock—the regular coating system listed above is used. Where there is medium rock, dirt for padding is hauled in. Rock shield is used where there is heavy rock.

A conveyor system is being used to load coating material into spare kettles on the line. The conveyor is mounted on a flat-bed truck and is driven by a small air-cooled engine. The 120-lb. asphalt bundles are broken directly on the bed of the truck and tossed on the belt system for loading. The system pays off since loaded kettles do not have to be hauled any great distance. An empty kettle is spotted about where the coating crew will run out of hot coating. Then, the truck brings enough dope from a central stockpile to charge the kettle.

New instrument measures coating . . . Besides the two electrical holiday detectors in use, Colorado Interstate is using another electrical instrument for checking the coating. This is a Coatingage made by Branson Instruments, Inc., and is used for measuring coating thickness. Though available for several years, this is the first reported use of such an instrument for measuring pipeline coating thickness.

Where accurate thickness control is of vital concern, the instrument has two advantages. It leaves no pinholes which later have to be patched. And the coating can be checked all around the pipe in a matter of seconds.

Basically the instrument is for measuring thickness of nonmagnetic substances over a magnetic base. It has a self-contained battery power supply, low-frequency oscillator, detector circuit, and an indicating meter calibrated in mils.

The detector circuit has a small magnetic pickup coil which is placed directly against the coated pipe. The coil is excited by the oscillator. Any change in distance between the coil and pipe changes the reluctance of the magnetic path and causes a corresponding change in the meter reading.

The instrument is first calibrated against a known thickness of plastic placed over a coupon cut from the pipe to be coated. The meter is adjusted to read thickness of the plastic test piece. Then when the instrument is used on the coated line it reads coating thickness to an accuracy of 10 per cent.

Lowering in . . . Specifications call for all lowering in to be done in the morning or at least when temperature is below 85°. Cool weather through July and into August had allowed lowering in work to go on at any time during the day. Lowering in tractors on this job are equipped with conventional slings.

Testing and Operation

Main-line valves will not be set until all pipe-laying work is finished. Then valves will be set about each 10 miles. These will be manually operated valves but will be equipped for later switch-over to automatic operation.

The line will be tested in two sections, using gas as the test medium.

Test pressure at the mill was 1,060 psi. Field test pressure will be 935 psi. prior to placing the line in service. The line is designated for ultimate operating pressure of 850 psi.

The line being built this year will have no compressor facilities. A light load is expected for the line's operations until the remaining 240 miles of line is built and flow is reversed. Then a compressor station will be built near Rock Springs where the tiein is made to Pacific Northwest. This will give an initial capacity into Denver of 100 M.M.s.c.f.d. Later a booster station may be built somewhere near Laramie to increase the capacity to an ultimate 200 M.M.s.c.f.d.

High-Alumina Catalyst Gets High Score in Test

Product distribution is improved, susceptibility to poisoning by oil-borne metals is reduced, and operating costs are lower

by O. A. Wunderlich,* J. J. Prichard,† and F. Emerson Ivey, Jr.*

A FLUID cracking catalyst containing 25 per cent alumina has demonstrated greater structural and catalytic stability than 13 per cent alumina catalyst in a commercial plant test. The high-alumina catalyst has reduced susceptibility to poisoning by oil-borne metals, and thus results in a lower-cost operation.

At the same catalyst cost, product distribution is substantially improved.

The test site was the 11,500-bbl. per stream day U.O.P. stack-type fluid unit of Frontier Oil & Refining Co. near Buffalo, N. Y. The unit is of conventional design with two-stage cyclones in the regenerator and no feed preheater.

The gas-oil charge stock is prepared in a combination atmospheric-vacuum topping unit, a light-gas-oil side stream from the atmospheric tower being blended with the overhead and two side streams from the vacuum tower. The crude charge is of mixed origin generally from the West Texas, Kansas, Oklahoma, and Illinois fields and has a characterization factor of 11.95.

Good test spot . . . This refinery proved to be an excellent test location, since the cat cracker is coupled to only the topping and polymerization facilities, thus minimizing operational fluctuations caused by the demands of the related processes and making it possible to obtain relatively accurate product yields. In addition, the fluid-unit operation had been affected by high concentration of metals in the charge stock, a condition which permitted ample opportunity for a new catalyst to demonstrate any effectiveness in contamination resistance.

Spectroscopic analysis of the stock indicated the following levels of contamination:

	Parts per million
Nickel	0.2 to 0.4
Vanadium	0.4 to 1.1
Iron	0.5 to 2.5
Copper	0.003 to 0.2
Chromium	0.006 to 0.01
Sodium	0.07 to 0.12
Calcium plus magnesium	0.64 to 2.36
Lead plus tin	0.23 to 0.35

Other inspections are included in Table 3.

TABLE 1—TYPICAL PROPERTIES OF FRESH HIGH-ALUMINA CATALYST

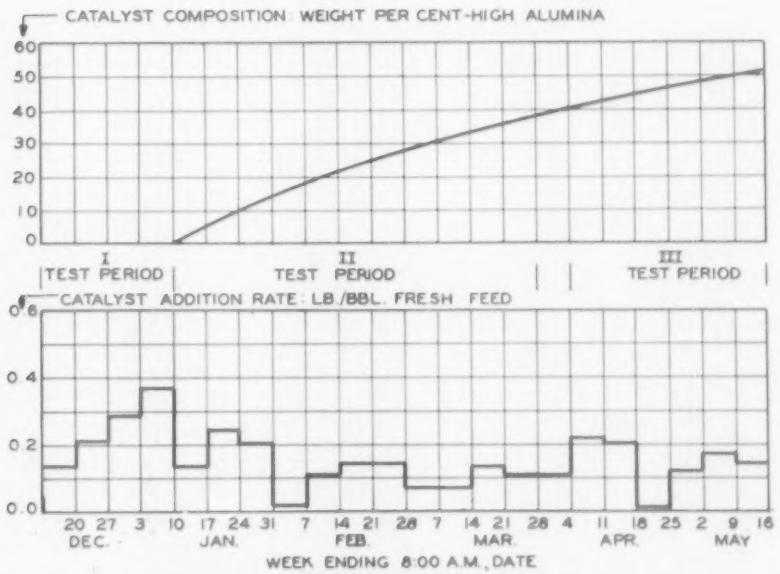
Shipment Sample Analysis

Analysis, wt. per cent:	
Al_2O_3	23.12
Na_2O	0.017
Fe	0.024
SO_4	0.21
I.V. at 1,500° F.	13.47
Particle size, wt. per cent:	
Screen, U. S. (cum.):	
On 100	0.8
On 140	5.3
Through 200	77.1
Subsieve, C.A.E. (microns):	
0-20	2.9
20-40	9.9
40-80	58.6
80+	28.6
Average size (microns)	67.0
Density after 1,000° F. pretreat:	
Compacted, lb. per cu. ft.	36.3

Production Sample Analysis

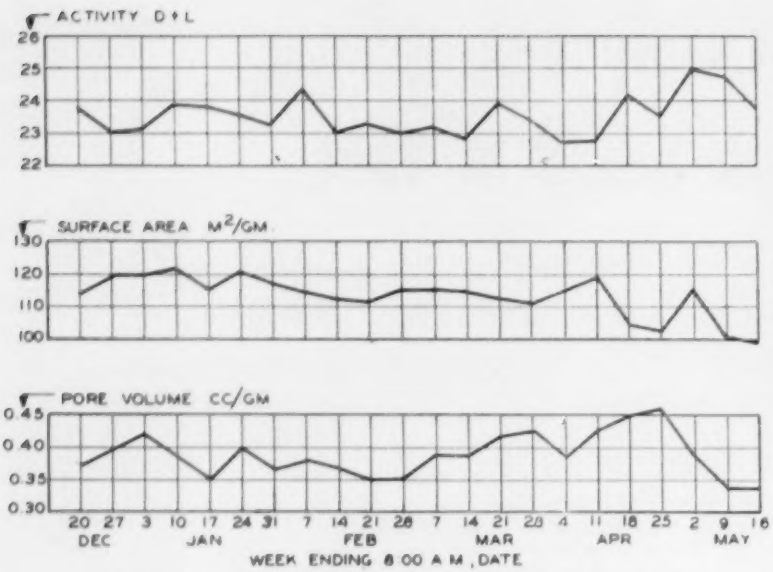
Attrition:	
Jersey index	1.5
Davison index	12.6
Activity (D + I):	
Pretreatment:	
3 hours, 1,000° F.	56.2
3 hours, 1,550° F.	55.6
24 hours, 1,050° F.*	35.8
Surface area (sq. m./g.):	
Pretreatment:	
3 hours, 1,000° F.	436
3 hours, 1,550° F.	346
24 hours, 1,050° F.*	166
Particle density (g./cc.):	
Pretreatment:	
3 hours, 1,000° F.	0.85

*60 psig. steam.



CATALYST COMPOSITION and consumption, high-alumina test run. Fig. 1.

*Technical service department, Davison Chemical Co., and †process control supervisor, Frontier Oil & Refining Co.



CIRCULATING CATALYST properties, high-alumina test run. Fig. 2.

Original operations . . . Using 13 per cent alumina microspheroidal synthetic fluid cracking catalyst, the daily fresh-catalyst addition rate was in balance with stack losses when maintaining the desired circulating catalyst activity level of approximately 24 Jersey D + L (Davison modification), corresponding to 27-28 U.O.P. weight activity.

Since laboratory evaluation of the new high-alumina catalyst (Table 1) indicated a higher degree of activity maintenance than 13 per cent catalyst, the test run was planned to continue the balance between losses and additions. The particle-size distribution of the 25 per cent alumina catalyst was selected to match that of the 13 per cent alumina catalyst used during prior operations.

Obtaining the Data

Products from the fluid unit consist of a dry-gas stream (essentially C_2 and lighter), a C_3-C_4 polymerization feed, gasoline, light furnace oil, and decanted oil. Heavy cycle gas oil is recycled to extinction. Fresh feed, dry gas, and poly feed are measured by recording flow meters, while liquid products are measured by daily tank gages. A sampling and analytical schedule was set up to make possible the calculation of corrected daily ultimate yields of each significant product.

To this end, low-temperature Podbielniak distillations were obtained on the dry-gas stream at least once per week, Pod distillations on the C_3 plus C_4 poly feed stream at least twice per week, and other critical inspections on these two streams daily. The analysis of all liquid streams for critical properties was made at a frequency which varied between once every 2 hours to once per day. Daily samples of both spent and regenerated catalyst were withdrawn, and complete inspections on these samples were obtained in the Davison laboratory every third day.

Product yields . . . The method for calculating the basic product yields is conventional. Assuming that the fresh-feed meter was probably the greater source of error, measured yields were corrected to 100 per cent weight recovery on a pro rata output basis. Coke yield was determined from the flue-gas analysis and air rate. Catalyst-to-oil ratio was calculated by heat balance. To assure consistency in the basic yields, the gasoline as determined was corrected to a C_5-330° F. A.S.T.M. 90 per cent point fraction (equivalent to 390° F. A.S.T.M. end point) using the Reid vapor pressure and calculated true-boiling-point curve.

The heavy end of the gasoline was added to the light-furnace-oil yield, and the C_4's from the gasoline were added to the C_4 fraction of the poly feed as determined by its low-temperature distillation. The C_3's from the dry gas were added to the corresponding fraction of the poly feed. Finally, conversion (gas-oil disappearance) was calculated from the corrected yields using a 390° F. A.S.T.M. cut point. The data from each day's operation were calculated on this basis.

The formal test run started on December 13, 1954, approximately 1 month before the introduction of high-

TABLE 2—REPRESENTATIVE CATALYST USAGE AND PROPERTIES

Test period—	1	2	3
Catalyst composition, wt. per cent:			
Low alumina (nominal 13 per cent)	100	62.9	50.4
High alumina (nominal 25 per cent)	0	37.1	49.6
Addition rate:			
Tons per day	1.14	0.46	0.76
Pounds per barrel fresh feed	0.25	0.11	0.17
Dollars per day	393	179	296
Stack loss, tons per day	1.14	0.46	0.76
Withdrawal, tons per day	0	0	0
Circulating catalyst:			
Chemical analysis, wt. per cent:			
Al_2O_3	12.25	15.65	17.77
Na_2O	0.17	0.10	0.07
Fe	0.79	1.03	1.01
SO_3	0.10	0.15	0.07
V_2O_5	0.21	0.36	0.31
Ni	0.08	0.11	0.09
Cu (p.p.m.)	4	5	1
Physical properties:*			
Surface area (sq. m/g.)	119	111	100
Pore volume (cc./g.)*	0.39	0.43	0.34
Regeneration index†	3.2	2.8	3.0
Compacted density (lb./cu. ft.)	57.1	55.7	55.5
Activity and selectivity:			
D + L, volume per cent L.P.‡	23.5	23.4	24.7
U.O.P., weight	27.8	27	29
Carbon prod. factor‡	1.95	2.80	2.67
Gas prod. factor‡	2.00	1.95	2.07
Particle-size dist., wt. per cent:			
Screen, U. S. (cum.):			
On 100	1.5	1.4	0.8
Through 200	82.1	84.3	84.3
Subsieve, C.A.E. (microns):			
0-20	1.1	1.5	0.4
20-40	10.0	4.5	4.6
40-80	80.2	83.4	91.3
80+	8.7	10.6	3.7
Average particle size	60	62	62

*By low-temperature nitrogen adsorption. †An inverse function of first order reaction constant. Determined in laboratory static bed test. ‡Modified Jersey D + L method.

alumina catalyst. During this interval, Test Period 1, the unit operation was stable using a nominal 13 per cent alumina synthetic microspheroidal catalyst.

Test Period 1

During the December 13-January 10 test period, the average daily fresh catalyst addition rate was 1.14 tons, equivalent to 0.25 lb. per barrel of fresh feed (Fig. 1). The values for the entire month of November using the same fresh catalyst were 1.28 tons per day, equivalent to 0.27 lb. per barrel of fresh feed. Thus the unit was lined out and the weekly variation in consumption rate was probably a random fluctuation due to errors in the silo gaging.

Average properties of the circulating catalyst during this test period are shown in Table 2. The alumina content averaged 12.25 per cent. Activity as measured by the Davison modification of the Jersey D + L test averaged 23.5 and by the U.O.P. weight method, 27.8 (Table 2, Fig. 2). Surface-area maintenance was high, averaging 119 sq. m. per gram, with a pore volume of 0.39 cc. per gram.

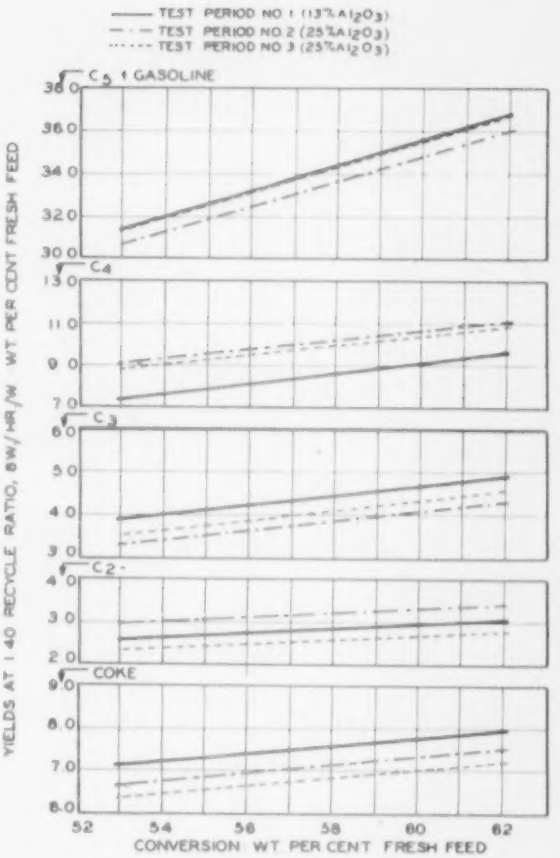
The contamination problem showed up in both the chemical analysis of the circulating catalyst and in the selectivity factors as determined in the activity test. The catalyst contained on the average 0.21 per cent vanadium as oxide, 0.08 per cent nickel as metal, 0.79 per cent iron as the metal, and gave an average carbon producing factor of 1.95 and gas-producing factor of 2.00.

Operating conditions . . . The average operating conditions during Test Period 1 are shown in Table 3, and the corresponding corrected yields in Table 4. The data in both tables are the averages of daily observations and corrections. Since conversion level varied over a 5 per cent range during this test period, it was necessary to consider product distribution on the basis of yield - conversion relationships, rather than the single-point averages as could be done with the catalyst properties.

The corrected daily data were used to establish these yield-conversion relationships as accurately as possible. First, inspection of the charge-stock inspections and operating conditions led to the conclusion that the variations in each were sufficiently small that they did not exert a measurable influence on product distribution. Second, it was decided from preliminary plots of these data that linear correlations would be satisfactory over the 5 per cent range in conversion. The best lines for each product were then calculated using standard statistical methods. The resultant weight yield-conversion correlations are shown in Fig. 3.

Product quality during Test Period 1 was typified by gasoline octane numbers of 92.8 research (F-1) clear and 98.2 research (F-1) + 3 cc. TEL, poly feed containing 53 per cent olefins, dry gas containing 5.2 per cent olefins, and coke containing 11.5 per cent hydrogen.

Regenerator performance was excellent in spite of the heavy coke yield. With good air utilization averaging 12.7 lb. per pound of coke, the observed coke burning rate of 0.14 lb. per hour per pound catalyst was high. In addition, plant performance was confirmed by the laboratory regeneration index of the circulating catalyst, which at 3.2 indicates excellent inherent regenerability.


TEST PERIOD NO 1 (13% Al_2O_3)
TEST PERIOD NO 2 (25% Al_2O_3)
TEST PERIOD NO 3 (25% Al_2O_3)
C_5 + GASOLINE
C_4
C_3
C_2 -
COKE
YIELDS AT 1.40 RECYCLE RATIO, BW/HR/W WT PER CENT FRESH FEED
CONVERSION WT PER CENT FRESH FEED

PRODUCT DISTRIBUTION, high-alumina test run. Fig. 3.

Also, the low carbon on regenerated catalyst led to the same conclusion. The CO_2/CO ratio of 1.92 is extremely high for an operation with synthetic catalyst and was very likely associated with the high metals content of the circulating catalyst.

Test Period 2

On January 11, Test Period 2 began. The new high alumina catalyst was added to the circulating inventory at the existing daily rate. There was no fortification of the inventory with the 25 per cent alumina catalyst by a massive replacement. Soon thereafter a reduction in catalyst stack loss was observed through a lower daily addition rate.

As shown in Fig. 1, a new equilibrium was reached by early February. From January 11 through January 31, the average daily catalyst addition rate was 0.80 ton per day or 0.20 lb. per barrel of fresh feed. During February the averages were 0.47 ton per day or 0.11 lb. per barrel, and for March were 0.38 ton per day or 0.095 lb. per barrel. Thus, the high-alumina catalyst consumption lined out 60 per cent lower than that with 13 per cent alumina catalyst.

Fig. 2 shows the chronological change in activity, surface area, and pore volume. The record indicates that after the first 4 weeks, catalyst properties had reached new equilibrium values only slightly different from those during Test Period 1:

Test period	Average for	Activity D + L.	Activity U.O.P.	Surface area (sq. m./g.)	Pore volume (cc./g.)
1	December 13-January 10	23.5	28.0	119	0.39
2	February	23.4	29.5	114	0.36
2	March	23.3	27.5	114	0.40

High structural stability was shown by the maintenance of pore volume although the average age of the catalyst retained in the unit increased markedly.

The average vanadia content was 0.21 per cent during Test Period 1; this increased to 0.36 per cent late in March. The nickel content increased by about the same proportion.

The effect of the increased metals content was also found in the selectivity factors as measured in the laboratory activity test of the circulating cat-

alyst (Table 2). The carbon-producing factor increased in proportion to the increase in metals content and in inverse proportion to the decreased catalyst consumption. However, the gas-producing factor apparently was relatively insensitive to these changes.

The new equilibrium levels were reached within 4 weeks after the change to high-alumina catalyst. This is in line with the theory that it is the freshly added catalyst which controls the cracking reaction, and that the aged component of the catalyst inventory acts mostly as a heat transfer medium.

Product distribution . . . Addition of high-alumina catalyst had little effect on product distribution. There was considerable change during Test Period 2 in product distribution, but this was traced to other factors.

Process variables . . . To develop the relation of recycle ratio to product yields during Test Period 2, the corrected daily yields and operating data were used. The assumption, justified by inspection, was made that, over the 8 per cent range in conversion under consideration, the effect of conversion on each product yield would be a linear function. Thus, if the yield-conversion ratio were plotted against conversion, the data should define a horizontal line. Systematic departure from this condition would then indicate the independent effect of another variable or variables.

Linear correlations of yield-conversion vs. recycle ratio and space velocity were carried out using the statistical method of least squares. The daily yields of each product were adjusted to a recycle ratio of 1.40 and a space velocity of 8.2 w./hr./w. which were the prevailing average conditions during Test Period 1. This method of correction removes only the independent effects of the variables considered, but does not eliminate the existing random fluctuations typical of commercial data.

The adjusted daily yields were then correlated with conversion level, again by the method of least squares. The differences in the slopes of the lines in each product family were then tested for statistical significance, and when these were found to be nonexistent, common slopes were calculated by standard statistical methods to arrive at the best estimate of the real effect of high-alumina catalyst on product distribution at constant operating conditions and the 60 per cent lower catalyst addition rate. The comparison is illustrated in Fig. 3.

TABLE 3—REPRESENTATIVE OPERATING CONDITIONS

Test period—	1	2	3
Catalyst composition, wt. per cent:			
Low alumina	100	62.9	50.4
High alumina	0	37.1	49.6
Charge-stock inspections:*			
Gravity, °A.P.I.	28.0	27.7	28.2
Distillation, A.S.T.M., °F.:			
I.b.p.	475	448	448
10 per cent	573	572	558
50 per cent	707	720	
Conradson carbon, wt. per cent	0.33	0.39	0.40
Sulfur, wt. per cent	0.47	0.46	0.47
Aniline point, °F.	193	192	188
Reactor operation:			
Temperature, °F.	885	881	878
Pressure, psig.	14.4	15.7	18.8
Space velocity (total feed), w./hr./w.	8.2	16.6	16.0
Catalyst-oil ratio (total feed)	10.0	9.4	9.0
Recycle ratio	1.40	1.38	1.42
Stripping steam, lb./M. lb. cat. circ.	2.6	2.5	2.3
Catalyst inventory, tons	10.4	5.1	5.3
Catalyst-circulation rate, tons/min.	14.1	13.6	12.9
Regenerator operation:			
Temperature, °F.:			
Dense phase	1,125	1,141	1,137
Dilute phase	1,138	1,162	1,155
Pressure, psig.	19.7	21.0	24.9
Air rate, M.s.c.f./min.	25.5	23.8	25.0
Carbon burned, lb./hr.	8,102	7,537	7,749
Hydrogen burned, lb./hr.	1,052	1,106	1,078
Coke burned, lb./hr.	9,154	8,643	8,827
Coke-burning rate, lb./hr./lb. cat.	0.14	0.11	0.11
Air utilization, lb./lb. coke	12.7	12.6	13.0
Carbon on regen. cat., wt. per cent	0.23	0.16	0.17
Flue gas, volume per cent:			
CO_2	11.5	12.5	12.1
O_2	0.3	0.1	0.2
CO	6.0	5.1	4.9
CO_2-CO	1.92	2.56	2.47
Catalyst inventory, tons	32.3	39.6	38.5

*Spot samples.

Constant-conversion results . . . The difference in the intercepts of the lines for Test Periods 1 and 2 indicated that the following changes in product distribution had occurred at constant conversion level within the range encountered:

	Per cent
Coke	down 0.5
Gas, C_2 and lighter	up 0.4
C_3	down 0.6
C_4	up 1.5
C_5-390° F. gasoline	down 0.5

In brief, the operation with high-alumina catalyst at the reduced catalyst addition rate seemed to be characterized by small shifts in the product distribution from the coke and gasoline fractions into the dry gas and C_4 fractions. It is equally difficult to characterize this change as being favorable or unfavorable in itself. The loss in gasoline was more than recovered through the gain in poly feed, while the decreased coke make and the increased yield of dry gas were in opposition in their effect on unit capacity.

During Test Period 2, the high-alumina catalyst usage lined out at a rate equal to a daily catalyst cost of $206 or $0.039 per barrel of converted fresh feed, while the equivalent cost of the 13 per cent alumina catalyst used during Test Period 1 was $393 per day or $0.070 per barrel converted. Prices of $0.1950 per pound for 25 per cent alumina and $0.1725 per pound for 13 per cent alumina were used in these calculations.

During the 13 per cent alumina test period the flue gas contained 0.3 per cent oxygen, and CO_2 and CO in the ratio of 1.93. The oxygen content decreased to 0.1 per cent by the end of March and the CO_2-CO ratio had increased to 2.50. This change in values was progressive as the high-alumina catalyst concentration increased. Thus it can be speculated that the metals which act to degrade the cracking reaction also promote combustion during regeneration.

The high-alumina catalyst appears to have had no effect on product quality or regeneration. There were no changes in either the C.F.R.R.-clear or leaded octane numbers of the 9-10-psi. R.v.p. gasoline as the high-alumina concentration increased.

Test Period 3

Since the product distribution obtained during Test Period 2 seemed to indicate that catalyst selectivity had not markedly deteriorated although the degree of catalyst contamination was much more severe, Test Period 3 was begun during which the effect of a somewhat higher catalyst addition rate would be observed. To initiate the

change, approximately 5 tons of equilibrium catalyst was withdrawn from the regenerator on April 8 and replaced with fresh catalyst during the next 2 days. For the remainder of Test Period 3, the daily addition rate was generally higher than during Test Period 2, averaging 0.65 ton per day or 0.15 lb. per barrel through May 16 when the plant was shut down for its annual turnaround.

The effects of the accelerated addition rate were soon observed on the properties of the circulating catalyst. Activity increased about 2 D + L or 3 U.O.P. weight units, but surface area became erratic and showed some tendency to decline slightly. The metals content decreased, and the carbon producing factor followed the same trend. Most of these changes could not be considered unique to the high-alumina catalyst, since they would be expected to occur with any catalyst when average age in the unit was reduced.

Product distribution . . . It was in product distribution that the important benefits were found. The data were evaluated in a manner identical with that already described for Test Period 2, and the final adjusted product yields are compared with those from Test Periods 1 and 2 in Fig. 3.

In contrast to the difficulty which existed when attempting to characterize the over-all operation during Test Period 2, the operation with high-alumina catalyst at the higher addition rate showed major improvement over that with 13 per cent alumina at the same conversion level:

	Per cent
Coke	down 0.8
Gas, C_3 and lighter	down 0.3
C_3	down 0.3
C_4	up 1.3
C_5-390° F. gasoline	unchanged

At the same gasoline yield, there was a shift from the coke and gas fractions into the C_4 component of the poly feed which was thus available for additional gasoline production. The simultaneous reduction in both coke and gas production had the effect of increasing fresh feed capacity.

Although the averaged octane numbers of the plant gasoline show a small decrease over the 13 per cent alumina operation, there is reason to believe that such a direct comparison is not realistic, due to a significant reduction in the R.v.p. of the gasoline during the latter period. In addition, a heavy gasoline stream was withdrawn.

It is believed that if gasolines of equal vapor pressures and distillation ranges were compared, octane numbers would be equal.

Cost factors . . . Comparison of Test Periods 1 and 3 should also include the respective catalyst costs, which were $393 per day or $0.070 per barrel of fresh feed converted (Period 1), and $253 per day or $0.047 per barrel converted (Period 3). Thus the gains in product distribution were achieved with a daily catalyst cost which was considerably lower.

The direction in which each product yield moved as a result of the increase in catalyst addition rate between Test Periods 2 and 3 suggests that a catalyst addition rate would be equal in cost to that with 13 per cent alumina catalyst might result in a product distribution considerably more advantageous from both product value and plant capacity.

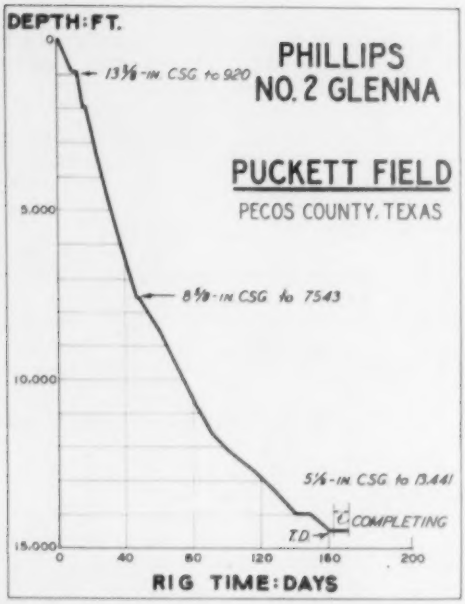
The improvement in catalyst selectivity which resulted from the acceleration in catalyst addition rate was also noticed in another way. During the latter part of Test Period 2, the average hydrogen production was 306 cu. ft. per barrel, but this dropped to an average of 186 cu. ft. per barrel during Test Period 3. The most abrupt change came from the initial 5-ton inventory replacement which brought hydrogen production to a low of 117 cu. ft. per barrel.

TABLE 4—REPRESENTATIVE PRODUCT DISTRIBUTION AND QUALITY

Test period—	1	2	3
Catalyst composition, wt. per cent:			
Low alumina (nominal 13 per cent)	100	62.9	50.4
High alumina (nominal 25 per cent)	0	37.1	49.6
Fresh feed:			
Barrels per day	9,346	9,486	9,243
Gravity, °A.P.I.	27.8	27.5	28.2
Yields corrected to 100 per cent recovery:			
Weight per cent fresh feed:			
Hydrogen	1.6	0.5	0.4
Methane + H_2S		1.5	1.1
Ethane-ethylene	1.4	0.8	1.4
Propane-propylene	4.5	3.4	4.5
Butanes-butylenes	8.9	7.2	8.5
C_5-390° F. gasoline	34.9	32.8	36.9
Light gas oil	32.2	34.9	29.2
Decanted oil	8.9	12.0	10.7
Coke	7.6	6.9	7.3
Volume per cent fresh feed:			
Propane-propylene	7.4	5.8	7.6
Butane-butylenes	13.5	11.1	13.2
C_5-390° F. gasoline	41.4	38.9	43.2
Gas oil	32.4	35.1	29.4
Decanted oil	8.6	11.5	10.4
Conversion:			
Weight per cent fresh feed	58.9	53.1	60.1
Volume per cent fresh feed	59.0	53.4	60.2
Selectivity:			
Weight coke × 100/weight converted	13.0	13.0	12.1
Volume gasoline × 100/volume converted	70.1	72.9	71.8
Weight dry gas × 100/weight converted	5.1	5.3	4.8
Cubic feet H_2/bbl. fresh feed		295	235
Quality of plant streams:			
Dry gas:			
Specific gravity	0.441		0.540
Volume per cent olefins	5.2		11
C_3 + C_4 (poly feed):			
Specific gravity	0.555	0.550	0.563
Volume per cent olefins	53	55	56
Light gasoline:			
Gravity, °A.P.I.	61.9	63.3	60.2
R.v.p.	10.2	10.0	7.4
Octane numbers:			
F-1 clear	92.8	92.7	91.6
F-1 +3 cc. TEL	98.3	98.2	97.4
Heavy gasoline:*			
Gravity, °A.P.I.			39.4
I.b.p., °F., A.S.T.M.			233
End point, °F., A.S.T.M.			477
Octane, F-1 +3 cc. TEL			92.8
Light gas oil:			
Gravity, °A.P.I.	28.0	29.2	28.3
I.b.p., °F., A.S.T.M.	421	409	463
End point, °F., A.S.T.M.	674	674	649
Heavy gas oil:			
Gravity, °A.P.I.	25.5	27.5	26.9
I.b.p., °F., A.S.T.M.	524	482	475
90 per cent point, °F., A.S.T.M.	738	728	728

*Heavy gasoline withdrawal begun on April 4.

READY TO GO DEEP is Phillips' No. 20 rig in Puckett field of West Texas. When the hole gets through the troublesome shallow lost-circulation zone, it may run into heaving shale and chert formations before reaching total depth.



PROGRESS in the last 10 years is drilling of wells in 5½ months. First well in area took 21 months. Intermediate casing shuts off troublesome shale section.

Here's West Texas' Deepest, Toughest Drilling

Deepest production in West Texas today is in Puckett field of Pecos County. Phillips Petroleum Co. is producing gas from the Ellenburger in that field from below 15,000 ft. Puckett is not yet fully developed, and there will certainly be more deep tests in the same general area. The experience of Phillips in Puckett should be of value to other operators planning deep wells in this region.

by Ed McGhee
District Editor

IN spite of the fact that Puckett field is the deepest production in West Texas, most of the trouble in drilling its wells comes in shallow formations. Cavernous and crooked-hole zones near the surface slow drilling and make it expensive.

Phillips Petroleum Co. now has 13 gas producers in Puckett field and has drilled 4 dry holes. Houston Oil Co. of Texas has recently completed its only hole—a successful gasser.

All of the presently producing wells are completed in the Ellenburger and yield dry gas with a high carbon dioxide content. One well which was dry in the Ellenburger, Phillips completed as a sweet-gas producer in the Pennsylvanian. However, this well soon died.

Puckett lies on the southwest flank of the Central Basin platform. It is a large anticline with approximately 2,800 ft. of relief and is not yet fully defined. One notable difference from the densely drilled areas to the north is that the usual shallow red beds and salt section are missing at Puckett. The formations to 7,200 ft. are primarily sands and limestones.

Company rigs . . . When the 1 Glenna, which turned out to be the discovery well, was planned, contractors submitted bids of $35 per foot for drilling. So, in April 1951, Phillips' No. 20 rig rigged up and started drilling. This first well required 13 months to reach total depth and set 5½-in. production casing.

During subsequent development of the field, there were as many as four company rigs in the field at one time. One of these was a light rig that set surface pipe before the big rigs moved on location. Two of these big rigs worked under derricks and one under a mast.

Most Phillips wells at Puckett were drilled by the company rigs. However, Loffland Brothers Co. drilled two on a day-work basis, and Trinity Drilling Co. drilled two on day work. Trinity also drilled a well on a footage basis. This contract called for $13 per foot to 11,000 ft. or to the top of the Devonian.

Biggest problem . . . Worst problem in drilling the Puckett wells was complete loss of circulation to shallow formations. The formations apparently are cavernous — on occasions the bit dropped 7 or 8 ft. while drilling. The saying among the rig crews was that the loss of mud would come "sooner or later—but it would certainly come." There was no correlation from well to well as to depth at which the caverns would be drilled. In some wells, the loss was as shallow as 640 ft.; in others it ranged around 1,800 ft. In one well the loss came at 2,600 ft.; this one took 3 weeks to shut off. No well missed this trouble zone.

Phillips could not use air to drill these "honeycomb" formations as has been done in other West Texas fields with the same trouble. There is too much ground water at Puckett. Aerated mud, discussed later in this article, was tried on a test basis and gave some relief.

When a well drilled into a zone of complete loss, drilling continued until all the water on location was pumped away. To meet these emergencies, nine

500-bbl. tanks were placed on location and kept full of water at all times. When this reserve was pumped away, drilling stopped until there arrived enough water to continue.

Water supply came from six wells which were some 720 ft. deep.

In addition to the caverns, some of the wells had sulfur-water flows from a zone around 1,900 ft. This came from below the honeycomb zone into which circulation was lost.

Mesquite and cedar . . . Most commonly used material to restore circulation was mesquite and cedar brush. This was as good as anything else and had the advantage of being cheap and readily available from the surrounding countryside. Into one well went 27 bales of hay. This and the brush were shoved down the hole with the drill pipe until no more would go into the formation. Then, conventional loss-of-circulation materials—fibrous varieties—were added to form a bridge on the brush. This often required days and weeks before circulation was completely restored.

Shallow crooked hole . . . Another bad problem was caused by boulders imbedded in the weathered formations at the surface. When the bit struck one of these, the hole would wash out to the side and allow the bit to take a drastic kick from vertical. In one well, the crew could look down the surface hole and actually see where the hole had been deflected by a boulder.

As a result of this crooked-hole tendency, no appreciable amount of weight could be carried on the bit. Therefore, drilling was often extremely slow at surface. The final program for making the surface hole involved drilling an 8¾-in. pilot hole. This was reamed out to 12¼ in., and the 12¼-in. hole in turn was reamed to 17½ in.

Except for a minor tendency in some wells to go crooked at 10,500 ft., the remainder of the hole was kept straight with no problem.

Casing, drilling program . . . The casing program at Puckett was varied during early development, but most wells had 1,100 ft. of 13⅜-in. surface pipe and about 4,700 ft. of 8⅝-in. intermediate pipe. However, so much trouble arose from a shale section around 7,200 ft. that the later wells set the 8⅝-in. through this zone.

In drilling the 11-in. intermediate hole, 8-in. drill collars and 5-in. drill pipe were the rule. About 75,000 lb. was carried on the bit. Below 7,200 ft. in the 7⅞-in. hole, 6-in. drill collars and 4-in. drill pipe made up the drill string; and 45,000 lb. was run on the bit.

In only one Phillips well was there any trouble with a high-pressure zone above the Ellenburger. In this well, a Pennsylvanian sand blew out after circulation was lost in the Ellenburger. Before the well could be killed, some 35,000 sacks of mud had been pumped into the hole. When sufficient weight was built up to control the Pennsylvanian, circulation was again lost to the Ellenburger. About the same situation occurred in the recent well of Houston Oil Co. of Texas when gas was encountered in a Devonian section. On Phillips' well, the Ellenburger was later found dry, and completion was made in the Pennsylvanian at 13,218 to 13,245 ft. But the zone produced for only a short time.

Chert was drilled in some Puckett wells, ranging from some 600 ft. in the 1 Glenna down to 300 ft. in some wells to none at all in others. After the 1 Glenna, chert bits drilled these sections and penetration was not slowed greatly.

Mud programs . . . On the first six wells a gel mud was used from top to bottom of the hole. Then Phillips began to drill with water to about 10,000 ft. From that point to total depth, a Driscose, diesel-oil emulsion (about 7 per cent diesel oil) was carried.

BIT RECORDS, 2 GLENNA WELL, PUCKETT FIELD

Depth	Bits
0 to 985	Two 8¾-in. Two 12¼-in. Two 17½-in.
939 to 7,550	Twenty-seven 11-in.
7,550 to 13,922	Sixty-seven 7⅞-in. (including four chert bits)
13,922 to 14,520	Five 4½-in.

Below 10,000 ft. in some of the earlier wells, there was often trouble with gellation of the bentonite muds. The 220° to 230° F. temperature on bottom raised gel strengths sharply. As a result, the gas from the formations being drilled could not work out of the mud in the pits. Therefore, a high viscosity was required to keep the weight at the 11.5 to 11.6 per gal. needed. With the CMC muds viscosity was kept lower and gas worked out of the mud quickly.

On wells drilled with water, mud was substituted into the hole when time came to run the 8⅝-in. intermediate string of casing. Then, after the casing was cemented, the mud was circulated out of the hole and water was carried to 10,000 ft. However, on Phillips' last well, the A 1 Robbins, water was left in the hole while the casing was run. There was no trouble either in running or cementing the string to 7,600 ft.

Aerated-mud test . . . It was in Puckett field that Phillips carried out its first tests with aerated mud as a drilling fluid. The first test was conducted by injecting air into the mud stream between two pumps in series. Then, three tests, on the C-1 Odom, D-1 Odom, and the 2 Glenna were conducted with the air injected directly into the mud stream in the standpipe.

There were two important conclusions from the work. First, and most important, by reducing bottom-hole pressure, aerated mud increased drilling rate over straight mud drilling. Second, while it did not stop loss of circulation completely, aerated mud did reduce loss sufficiently to get through the trouble zones faster and cheaper.

Completion . . . On most of its completions, Phillips drilled completely through the pay before setting pipe. Then, in most cases pipe was set above the pay; this saved the cost of some 1,500 ft. of oil string and the cost of perforating the long producing intervals.

The Ellenburger was then acidized with treatments ranging from 3,000 to 20,000 gal.

For production, a retainer-type packer was run on wire line and set above the pay. At first, 2-in. tubing was run and set into the packer. Later the tubing size was raised to 2½-in. The annulus was left loaded with the drilling mud. Tubing head pressure is about 4,500 psi. shut in.

Ten years' progress . . . A really startling proof of the recent progress made by the drilling industry is the comparison between the latest Puckett wells and a nearby well completed 11 years ago. The Phillips 1 Ada C. Price is only a few miles east of the present Puckett field; and when completed it was the deepest well ever drilled. Finally abandoned in 1944 as a dry hole at 15,270 ft., the well required 21 months to drill.

In the 125-ft. section from 12,829 to 12,954 ft. in the Price well, a total of 148 bits were used. On the average, each bit made only about 10 in. Some bits made no visible progress at all in the "devilish chert." Four months went by before the well drilled out of this section. The latest Puckett wells cut this same section in a matter of days with two to four chert bits.

Where the Price well used a total 475 bits to 15,270 ft., recent wells used only about 220 bits and were completed in 5½ months.

References

1. Bobo, Hoch, Ormsby; Phillips Tests Air-Mud Drilling, The Oil and Gas Journal, January 24 and February 7, 1955.

2. Morrisey, Puckett Field Opens New Vistas in West Texas, The Oil and Gas Journal, November 8, 1954.

Gas-Electric Rig Provides Stiff Competition

Drilling time reduced 10 days at Headlee on 13,350-ft. wells

by Norman S. Morrisey
Drilling-Development Editor

DRILLING & EXPLORATION CO. is proving the value of gas-electric drilling equipment in Headlee field, Ector County, Texas. Its Rig. 14 drilled to 13,350 ft. in only 66 days, cutting 10 days from the normal drilling time in the field. D. & E.'s first well took 70 days to 13,350 ft. and the next attempt knocked 4 days off this record.

Equipment . . . Rig 14 has a steam draw works converted to electricity; it is powered by a 500-hp. d.c. motor (1,000 hp. intermittent). The rotary table is driven by a 225-hp. motor; one pump is driven by a 700-hp. d.c. motor and the other pump uses a 350-hp. d.c. motor. Power for the unit is furnished by two 150-kw. generators driven by two 6G-510 gas engines and five 60-kw. generators driving by five WAK gas engines. The rig is on a 136-ft. standard derrick with 14-ft. substructure.

Drilling . . . D. & E. drilled the British-American Oil Producing Co. 3 Parks in only 70 days from spud to total depth, using fifteen 12¼-in. and seventy-three 7⅞-in. bits. At 11,527 ft., the first R-1 bit was used and it made 436 ft. in 58¾ hours. At the time this bit was run, a W7R had cut 21 ft. in 3½ hours and was completely worn out.

Only two minor fishing jobs were necessary on the 3 Parks, costing a total of 40 hours of down time.

Customary practice is to set surface pipe at 365 ft. and drill a 12¼-in. hole to 6,100 ft. The intermediate 9⅝-in. casing is run and then a 7⅞-in. hole carried to total depth.

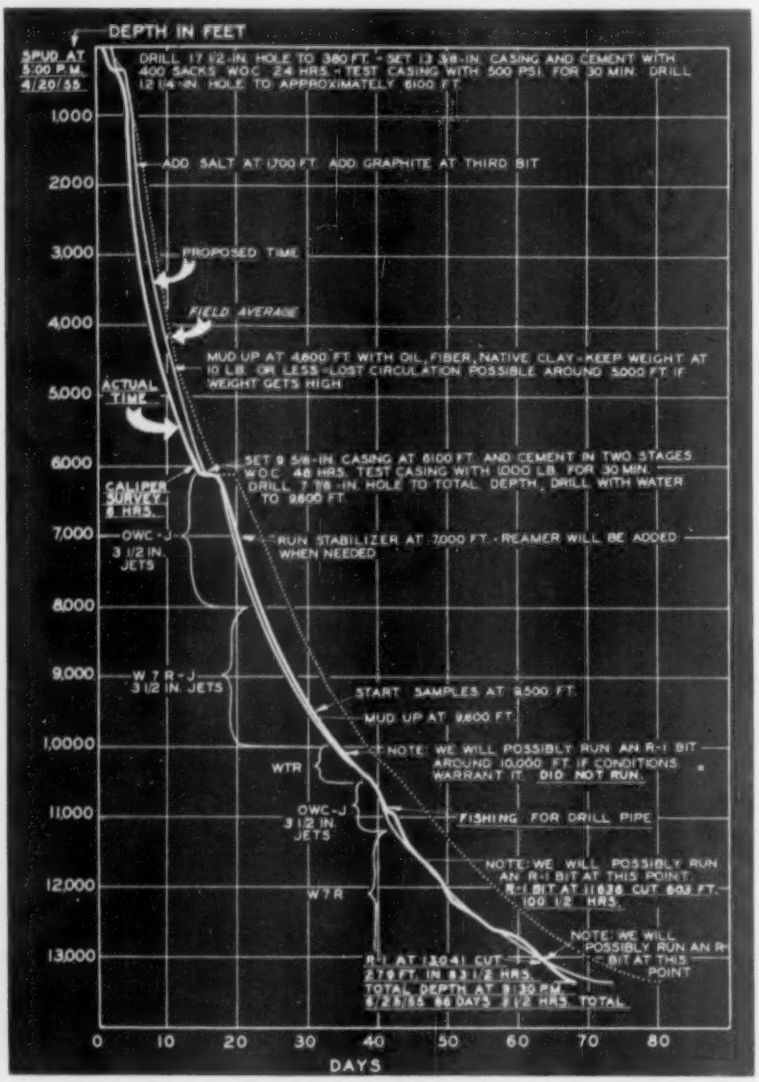
On the 3 Parks, D. & E. carried 40,000 to 50,000 lb. on the bit with a rotary-table speed of 55-60 r.p.m. With R-1 bits the weight was reduced to 30,000 lb. and 30 r.p.m.

D. & E. used graphite in the drilling mud on the second test, the British-American C-2 Parks, and this apparently improved bit bearing life in the tough digging through the pre-Pennsylvanian beds. Driller was running 65,000 lb. at a rotary speed of 45-50 in this section.

Gas-electric rigs . . . Manufacturers claim that gas-electric and diesel-electric drilling rigs have certain advantages over other types. The principal one is that the electric power plant can be so designed that the power source more nearly matches the speed-torque characteristics required for draw works, mud pumps, and rotary table.

Packaged engine-generator units are now available that can be placed anywhere near the well; there is no need for heavy foundations nor worry about alignment with mud pumps, etc.

Experience has shown that steam rigs can be readily converted to gas or diesel-electric. On top of that, these rigs can more than hold their own, even in fast West Texas drilling.


DEPTH IN FEET
SPUD AT 5:00 P.M. 4/20/55
DRILL 17 1/2-IN. HOLE TO 380 FT. - SET 13 3/8-IN. CASING AND CEMENT WITH 400 SACKS. W.O.C. 24 HRS. - TEST CASING WITH 500 PSI. FOR 30 MIN. DRILL 12 1/4-IN. HOLE TO APPROXIMATELY 6100 FT.
ADD SALT AT 1700 FT. ADD GRAPHITE AT THIRD BIT
PROPOSED TIME
FIELD AVERAGE
MUD UP AT 4800 FT. WITH OIL, FIBER, NATIVE CLAY - KEEP WEIGHT AT 10 LB. OR LESS - LOST CIRCULATION POSSIBLE AROUND 5000 FT. IF WEIGHT GETS HIGH
ACTUAL TIME
SET 9 5/8-IN. CASING AT 6100 FT. AND CEMENT IN TWO STAGES W.O.C. 48 HRS. TEST CASING WITH 1000 LB. FOR 30 MIN. DRILL 7 7/8-IN. HOLE TO TOTAL DEPTH, DRILL WITH WATER TO 9800 FT.
CALIPER SURVEY 6 HRS.
OWC-J 3 1/2 IN. JETS
RUN STABILIZER AT 7000 FT. - REAMER WILL BE ADDED WHEN NEEDED
W 7 R-J 3 1/2 IN. JETS
START SAMPLES AT 8500 FT.
MUD UP AT 9800 FT.
NOTE: WE WILL POSSIBLY RUN AN R-1 BIT AROUND 10,000 FT. IF CONDITIONS WARRANT IT. DID NOT RUN.
WTR
OWC-J 3 1/2 IN. JETS
FISHING FOR DRILL PIPE
NOTE: WE WILL POSSIBLY RUN AN R-1 BIT AT THIS POINT. R-1 BIT AT 11,638 CUT 603 FT. 100 1/2 HRS.
W7R
NOTE: WE WILL POSSIBLY RUN AN R-1 BIT AT THIS POINT
R-1 AT 13041 CUT 279 FT. IN 83 1/2 HRS.
TOTAL DEPTH AT 8:30 P.M. 6/25/55 66 DAYS 3 1/2 HRS. TOTAL
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
12,000
13,000
0
10
20
30
40
50
60
70
80
DAYS

DRILLING CURVE on the British-American C-2 Parks. Notice the close similarity between the forecast drilling curve and the actual. (Underscored data refer to actual operations on the well.)

S. E. G. DIGESTS

The Society of Exploration Geophysicists celebrated its Silver Anniversary meeting in Denver, October 3-6. Papers presented featured a wide variety of the latest scientific methods and here the Journal presents selected abstracts from these papers.

Majeau Lake, Alberta— A Discovery Resulting from a Restudy of Seismic Data

HUGO R. RENDEN, Texaco Exploration Co., Calgary, Alta.

THE discovery of Majeau Lake oil and gas field resulted from critical reexamination of existing seismic records in an attempt to find the "Rundle pinchout" between two wells. Early development confirms the seismic interpretations but indicated the geology to be more complex than was originally thought.

Exploring for Ancient Channels With the Refraction Seismograph

L. C. PAKISER, U. S. Geological Survey, Geophysics Branch, Washington, D. C., and R. A. BLACK, Grand Junction, Colo.

IN the Monument Valley of Arizona and Utah, uranium ore has been found in ancient channel deposits, primarily in the Shinarump conglomerate of late Triassic age. The seismic velocity in the Shinarump is substantially less than that in the Moenkopi formation of Early and Middle (?) Triassic age, which unconformably underlies the Shinarump. Therefore, the ancient channels can be located by using the refraction seismograph. Because the Moenkopi erosion surface in channel areas is curved, a delay-time method of analysis is used to determine the position in depth of the Shinarump-Moenkopi contact. The problem of velocity variations within the Shinarump can be overcome by bold interpretation supported by drill-hole and velocity control.

Review of Current Developments In Exploration Geophysics

MILTON B. DOBRIN, Magnolia Petroleum Co., Dallas.

THE most significant progress in exploration geophysics during the past year has been in the operational application of tools and techniques that were only in the development stage a short time ago. Magnetic tape recording and interval velocity logging are coming into extensive use in prospecting and contractors are offering both as commercial services.

Although current research in petroleum geophysics is concentrated more than ever before on the seismic technique, there have been important developments in the application of other geophysical methods to the search for solid minerals, particularly uranium. New logging techniques and airborne electromagnetic methods have been successfully applied for this purpose.

Interval velocity logs have given seismologists a better understanding of the process by which reflections originate from complexly layered formations. This understanding should lead to a more realistic interpretation of reflection data which may make it possible to map stratigraphic as well as structural features.

Other noteworthy developments in seismic prospecting during 1955 include new techniques for generating seismic energy, methods for more effective presentation of reflection data, and new approaches to the improvement of the signal-to-noise ratio on seismic records.

Theory and Application Of a Dual Frequency Airborne Electromagnetic System

D. G. MacKAY, Aeromagnetic Surveys, Ltd., Toronto.

THE problems involved in inductive electromagnetic surveys from aircraft are reviewed and the relative merits of phase and amplitude measurement discussed. Phase-measurement equipment operating on two independent frequencies is described, and the installation of the equipment in a PBY 5a aircraft illustrated.

A number of examples, taken from actual surveys, are given showing the method of presentation of the data, the interpretation placed upon various anomalies, and also something of the results achieved.

In conclusion, an opinion is expressed on the proper application of this type of airborne survey to modern mining exploration.

Exploration History of the Block 12 Area; Andrews County, Texas

J. H. DEMING and L. O. DAILEY, JR., Atlantic Refining Co., Dallas.

THE authors review the general history of the Block 12 area, Andrews County, Texas, from the first geologic interest in the area in 1920 to the present time. Successive torsion-balance, gravimetric, and seismic maps are presented and discussed. Subsurface geologic mapping and a geologic cross-section based upon well control are also presented with a summary of the generalized stratigraphy.

The authors call attention to a seeming correlation between progressive changes in reflection character and truncation of geologic markers.

Geophysical-Geochemical Prospecting for Uranium

M. E. DENSON, Atomic Energy Commission, Denver.

PHYSICAL and chemical properties of sedimentary rocks associated with uranium deposits have variations which indicate applicability of geophysical and geochemical exploration methods. Some of the variations in the properties can be attributed to geologic factors and phenomena connected with deposition of ore. Correlations between chemical and physical properties are used as a guide for sequencing of field techniques.

Geophysical field data are supplemented by geochemical data on trace quantities of uranium, thorium, and potassium. These data are augmented by other chemical information on soils, waters, and gases to serve as a guide for evaluation of prospective areas. Examples of such field data, including shallow seismic reflection, surface and in-hole resistivity, surface radiometric, and geochemical, from areas in South Dakota, Wyoming, and Colorado are presented to show the types of detectable physical and chemical variations found to be significant.

Alternative Modes of Seismogram Recording

F. S. KRAMER and R. A. PETERSON, United Geophysical Corp., Pasadena, Calif.

A SHORT discussion is presented on the relationship between the data traces on the seismogram and correlative geological features. Alternative modes of recording seismic data traces are then discussed, including various moving light spots, variable density, and coded flashing methods. Illustrative examples and comparisons are shown.

A Theoretical Map Of the Basement in Indiana Derived From Aeromagnetic Data

ISIDORE ZIETZ and JOHN R. HENDERSON, USGS, Geophysics Branch, Washington, D. C.

AN aeromagnetic map of Indiana has been compiled on a scale of 1:500,000 from published USGS aeromagnetic county maps. A map of the pre-Cambrian basement rocks has been constructed from depth determinations of more than 80 isolated aeromagnetic anomalies. The magnetic trends on the basement rocks are in general similar to the trends of the structure contour map of the top of the Trenton (Ordovician) limestone. There is also excellent agreement between the map and the six depths to basement rocks found by well drilling.

The contours on the basement rocks indicate the possible existence of a major northwest-striking ridge approximately 50 miles wide that does not appear on the structure contour map on the top of the Trenton limestone. The existence of the ridge is partially confirmed by a large gravity and magnetic anomalies at almost the same place.

Some Safety Aspects of Offshore Geophysical Operations From the Equipment Perspective

ARTHUR D. DARDEN, Higgins, Inc., New Orleans.

THIS paper outlines the existing authorities that govern marine inspection of vessels in service and under construction. It places the responsibility for the choice of the proper vessel including the features of safety and the qualified operations upon management.

Certain specific features of safety peculiar to geophysical service are discussed, including the proper grounding of electrical components in a wooden vessel. The stability considerations of a converted vessel and seaworthiness are discussed. In each case emphasis is placed on the consequences of damage to property and bodily injury. The functions and ability of the naval architect are discussed where it is felt that his services

based upon his qualifications and experience will contribute to a more efficient vessel and incorporate the safety features required by law and those which come from his experience.

The Habitat of Some Oil

G. M. KNEBEL, Standard Oil Co. (N. J.), New York.

DETAILED statistics have been prepared and studied for 236 or all of the major oil fields of the free world. They represent 217 billion barrels, which is 82.5 per cent of the free world's expected ultimate. The study shows the bulk of our oil occurs:

1. On the stable side of basins.
2. In anticlines.
3. In sandstone and carbonate reservoirs.
4. From formations of Mesozoic age or younger.
5. From depth range of 2,000 to 8,000 ft.

Most of the world's ultimate oil is 30° A.P.I. gravity or above with mixed and asphaltic-base oils predominating. The discovery of the "big" giants has been cyclic with 10-year intervals starting with the Lake Maracaibo discovery in 1917.

Symposium—On Multiple Seismometers

F. van MELLE, Shell Oil Co., Houston; **FISHER REYNOLDS,** Seismic Explorations, Inc., Houston; **ROBERT PALMER,** McCollum Exploration Co., Houston; **KENNETH BURG,** Geophysical Service, Inc., Dallas; **F. E. ROMBERG,** Geophysical Service, Inc., Houston.

THE various aspects of multiple-seismometer (and multiple-shot) exploration were discussed by participants in a 10-minute talk; each man gave his ideas as to the most important problems and pitfalls connected with such shooting. The economics of multiple shooting, the advantages to geologic understanding, the best methods of instrumentation, and the use of multiple shots and non-explosive energy, were treated.

The Refraction Seismograph In the Alberta Foothills

G. J. BLUNDUN, Oilwell Operators, Ltd., Calgary, Alta.

THE primary purpose in the use of the refraction seismograph in the Alberta foothills is the mapping of the Madison limestone together with the detection and definition of faults. The paper will deal with the advantages and limitations of refraction, both in-line and broadside, initial program, spread length, geophone separation, shot to spread separation, dynamite charges, system of survey and permissible tolerance, and other recommended field practices. Typical specimen seismograms and cross-sections illustrated, as well as a gravity meter-refraction comparison of a typical limestone fault.

Good Hope Field, St. Charles Parish, Louisiana—A Geophysical Case History

G. A. BURTON, Shell Oil Co., New Orleans.

GOOD HOPE field is located in the cypress swamps between the Mississippi River and Lake Pontchartrain near the northern limit of the South Louisiana salt-dome province. Cumulative production to January 1, 1955, is 19,691,033 bbl. of oil. Detailed reflection seismic surveys over a weak gravity anomaly disclosed a prominent structural uplift and suggested a deep-seated salt dome. Subsurface data from the field will generally confirm the original seismic interpretation although no salt has been encountered by the drill to a depth of 11,259 ft.

Regional Gravity Survey in Salt Lake And Utah Counties, Utah

KENNETH L. COOK and **JOSEPH W. BERG, JR.,** University of Utah, Salt Lake City.

DURING June to August 1954, the USGS made a regional gravity survey in Salt Lake and Utah counties, Utah. Gravity measurements were made at 1,100 stations in an area of about 2,100 sq. miles, and the results have been compiled as a Bouguer gravity anomaly map.

Past tectonic activity in the region has been great, and the regional gravity patterns reflect the present contrasts in the crust that are the product of several orogenies. A gravity high occurs over the northern Utah highland in the Antelope Island area. The gravity data give no evidence that the Uintah arch extends west of the Wasatch front. Steep gravity gradients corresponding with Basin and Range faults occur along (1) parts of the Wasatch fault zone; (2) a continuous fault zone 60 miles in length along the west margin of the Oquirrh, Boulter, and East Tintic Mountains; and (3) the Utah Lake Fault zone east of Lake Mountain and West Mountain.

A gravity high corresponds to the great fault block comprising the Oquirrh, Boulter, and the northern part of the East Tintic Mountains. The gravity data indicate that in the valley areas between this fault block and the Wasatch fault block, a great trough more than 100 miles long comprises a great belt of graben and smaller fault blocks of varied dislocations. Several large fragments lying immediately west of the Wasatch block have apparently dropped deeper than the other fragments as if slipping into a great crevasse.

Carbonate Reservoirs By Radiation Guard Logs

R. H. WINN, Halliburton Oil Well Cementing Co., Houston.

THIS paper presents a method of evaluating carbonate reservoirs from the radioactivity and focused resistivity surveys. The derivation of the method, its inherent limitations, and the relation of analytical technique to the petro-physical characteristics of rock matrices are discussed. Specific examples of successful application are illustrated.

Regional Geophysical Studies in the Uravan District, Colorado

H. R. JOESTING and **P. EDWARD BYERLY,** USGS, Washington, D. C.

REGIONAL gravity and aeromagnetic surveys have been conducted in the Uravan district of Southwest Colorado by the USGS as part of a study of major geological structure in the Colorado plateau. The Uravan district includes approximately the area between Lat. 38° 00′ and 38° 45′, bounded on the west by the meridian 109° 00′ and on the east by the Uncompahgre plateau and the meridian 108° 22′ 30″.

Elevations of gravity stations were determined from bench marks and by altimetry. The major gravity variations are due to changes in composition of the basement rocks and to variations in thickness of salines in the Paradox member of the Hermosa formation. Large negative anomalies are associated with the Paradox Valley and Gypsum Valley salt anticlines.

The major magnetic anomalies are related to changes of composition in the basement and to faults involving large displacements of basement rocks. The Uncompahgre uplift shows large anomalies. Smaller anomalies along Disappointment syncline suggest a downwarp resulting in a basement trough of comparatively great depth between Disappointment syncline and the Uncompahgre uplift.

Geophysical Case History, Parentis Oil Field, France

R. VAJK, Standard Oil Co. (N. J.), and **G. WALTON,** Carter Oil Co., Tulsa.

IN 1951, the French Government granted an exclusive exploration permit to the Esso R.E.P. (a Standard Oil Co. affiliate) over an area of 4,357,980 acres around Bordeaux in the northern part of the Aquitaine basin. This area was investigated first by surface geology, then it was surveyed by the gravity meter. In checking the gravity anomalies by the reflection seismograph a subsurface structure was found at Parentis in 1953 which was drilled in 1954 and was proved to be oil bearing. Parentis oil field is the most important oil field, not only in France, but in all Europe outside the Iron Curtain.

Gravity map, seismograph map, seismic profiles, telluric map and geological contour maps, the cross-sections of the Parentis structure are presented.

Specialized Mobile Equipment For Operations in Western Canada

FRED B. WALLIS, Northern Foothills Agreement, Calgary, Alta.

THE rugged, remote and inaccessible areas of Western Canada present obstacles to transportation which demand new and specialized vehicles for movement of seismic equipment. Although deep snow, heavy timber, and rugged terrain offer certain handicaps to seismic operations, the primary obstacle to unrestricted movement in bush areas is the widespread occurrence of a ground moss called "muskeg." To overcome this barrier, several vehicles have been developed and are being used successfully today in the search for oil. Three fundamental requirements of these machines are adequate power, exceptional traction, and a high flotation factor. The North King, Snowmobile, Scout, Bombardier and Sno-Car are examples. A short film demonstrates performance of the vehicles in some of the difficult operating conditions encountered in western Canada.

The Graphical Calculation of Total-Intensity Anomalies of Three-Dimensional Bodies

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CALCULATION of the total-intensity anomaly of a three-dimensional body of arbitrary shape is greatly facilitated by the orthographic projection of a topographic map of the body on a plane normal to the inducing field. The graphical integration is then effected by means of a modified Gassmann integration process. Applications to theoretical and laboratory models establish the relative accuracy of the method. Examples are given of applications to observed anomalies over geologic structures.

How Slim Can a Slim Hole Be?

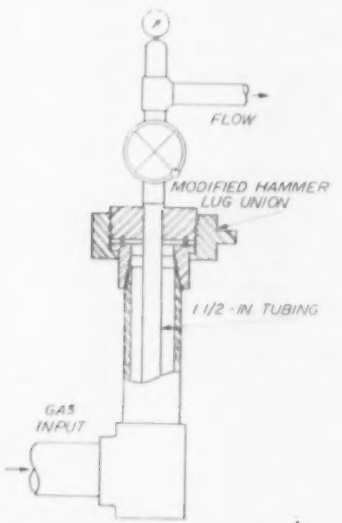
If problem of artificial lift is limiting factor, there's evidence that casing can be reduced to 2½ or 2 in.

by Alfred O. Fischer

IN many companies the present trend is to drill holes of smaller diameter. Holes to accommodate 4 and 4½-in. production casing are cheaper to drill and case than are the larger holes required for 5½ and 7-in. long strings.

While the economics of drilling and initial completion of slim holes are readily demonstrable, there remains an area of justifiable skepticism. Many of the problems which plague the production man must be anticipated and viewed in their relationship to the slim-hole programs. And probably the greatest of these problems is that of artificial lift. How will the well be produced after natural flow stops?

Author is Macco Oil Tool Co. distributor in South Texas.



SCHEMATIC drawing of a typical installation. Fig. 1.

One company with major holdings in South Texas has been gaining substantial slim-hole experience without actually having any slim holes. That is, they are producing the tubing wells of their dual completions as if they were slim-hole wells.

The wells were initially completed with 7-in. production casing and 2½-in. tubing. Where necessary, crossover equipment was run to place the less prolific of the two wells in the tubing. Increasing amounts of water in the production made the wells difficult to operate. It had been the company's procedure to squeeze off the water, but after several costly failures it was decided to try producing the water by artificial lift.

Macco fluid-operated flow valves were selected because of their sensitivity to well demands, their relative independence of input gas pressure, their very wide range of application, and their simplicity of control. This producer had had previous experience with fluid-operated valves in conventional installations. For this installation the Type CM-1 valves were mounted inside capsule mandrels which have the same outside diameter as 1¼ in. E.U.E. tubing couplings and approximately the same net clearance inside as 1¼-in. tubing.

Fluid packed pump anchors were adapted for the macaroni tubing selected for each job and used as packers.

Thus, this company has slim-hole conditions insofar as artificial lift is concerned. The "casing" is 2½-in. E.U.E. tubing and the production tubing is either 1½ in. plain end or 1¼-in. E.U.E.

The abandoned procedure of squeezing off the water had required a week or more of time by a large workover rig. The hole had to be mudded, and both casing and tubing wells were off production for the entire time — and added to the frustrating and expensive failure experience was another frequently encountered hazard; the "good" well could be damaged in the process of repairing the "bad" well.

The present procedure can be completed by a small pulling machine in less than 24 hours' rig time. The "tree" can be removed in the time it takes to open a 3-in. union. Normally the tubing well does not need to be loaded. During the entire operation the casing well is left open and producing, without interference.

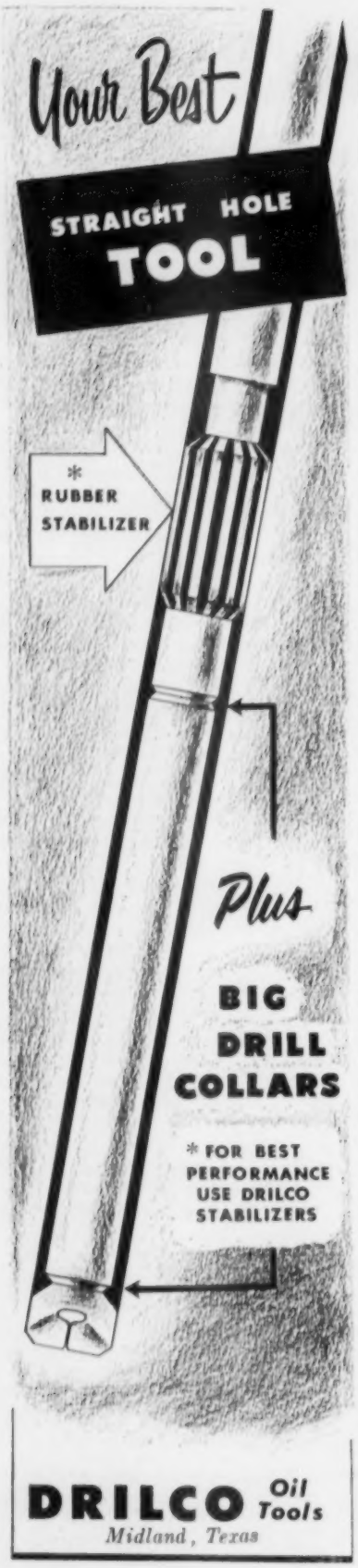
This is an instance in which the "slim hole" casing is 2½-in. E.U.E. tubing. It is a hole within a hole, and the problem of artificial lift would be the same if the 2½-in. were cemented in the ground. Furthermore, the gas-lift equipment used is available in a smaller size; capsule mandrels to run inside 2-in. tubing having the outside diameters of 3⅛-in. E.U.E. tubing collars and the net clearance inside equivalent to that of 1-in. tubing.

A typical installation is schematically illustrated in Fig. 1. Fig. 2 shows the suspension for the macaroni string.

Pertinent production data are tab-

TABLE I—PERTINENT PRODUCTION DATA

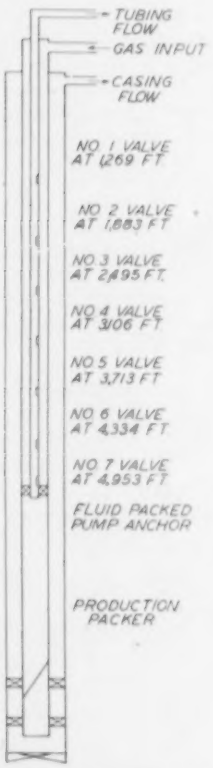
Well	Production, bbl. per day: Oil	Water	Total	Per cent b.s. and w.	Input gas (M.c.f.)	Input G.F.R. (c.f./b.)	Output gas (M.c.f.)	Form. gas (M.c.f.)	Form. G.O.R. (c.f./b.)	T.P. (psi.)	Sep. pres. (psi.)	Choke tubing	Sand perf. (ft.)	Gas-lift installation
A	42	67	109	61.3	21.5	197	90.5	69	1,636	250	153	15/64	7,300	4 valves—3,000 ft. 1½-in. plain
B	44	5	49	9.4	40.0	825	75.5	35.7	812	225	161	3/4	7,300	7 valves—4,937 ft. 1¼ in. E.U.E.
C	61.53	250.82	312	80.3	87.2	279	152	64.8	1,053	150	100	3/4	8,100	7 valves—4,753 ft. 1¼ in. E.U.E.
D	64.29	209.28	274	76.5	32.4	119	90.9	58.5	910	240	100	19/64	8,100	7 valves—4,802 ft. 1¼ in. E.U.E.
E	52.33	175.18	228	77.0	34.9	153	74.9	40.0	764	350	100	15/64	8,100	7 valves—1½ in. 4,938 ft.
F	24.16	65.99	90	73.2	54.5	605	70.7	16.2	671	305	139	12/64	8,500	7 valves—5,023 ft. 1½ in.



ulated in Table 1. Lift gas is available from the second compressor stage of a gas-injection system, at about 800 psig.

As is typical of water-drive production, the wells pass through a twilight period. During this period they cannot be depended upon to make their production. They may flow part of the time, frequently they die, yet they cannot be produced on large chokes or open flow lines because of the danger of excessive flow rates.

The fluid-operated valves, being sensitive to fluid weight, will serve these wells throughout their remaining productive lives. During this twilight period they simply stand by, injecting gas only when the fluid gradient becomes too heavy for natural flow. This will be followed by a period of continuous and increasing gas input as the wells pass through a constant flow gas-lift phase. Some of the wells, having lower productivity indexes, will go into a phase of lifting by intermittent heads. This is generally called intermittent lift, although the fluid operated valves require no surface time cycle controller, or intermitter, for their operation. Table 1 includes wells in all three of these phases of lift, accounting partially for the substantial differences in input gas-fluid ratios.


TUBING FLOW
GAS INPUT
CASING FLOW
NO. 1 VALVE AT 1,269 FT.
NO. 2 VALVE AT 1,883 FT.
NO. 3 VALVE AT 2,495 FT.
NO. 4 VALVE AT 3,106 FT.
NO. 5 VALVE AT 3,713 FT.
NO. 6 VALVE AT 4,334 FT.
NO. 7 VALVE AT 4,953 FT.
FLUID PACKED PUMP ANCHOR
PRODUCTION PACKER

THE 1½-in. macaroni tubing was suspended from a modified hammer lug union. Fig. 2.

Of the wells listed in Table 1, the first installation was made in December 1953. The others have been added since that time as the need arose. Only one installation, that in Well B, has had to be rerun. The macaroni string had been run initially to about 3,000 ft., with four valves. After about 6 months' operation, the fluid level had fallen to such an extent that adequate fluid was no longer available at 3,000 ft., and the depth of lift had to be increased.

This was a design failure based on faulty reservoir data, which had been assumed to be the same as those of Well A. The remedy for this lone failure set the standard for all future installations, and no further difficulty has been encountered.

Not all problems of slim-hole production can be anticipated, nor can all the solutions be as readily found as the gas lift solution found by the company whose experiences are related in this paper. Some techniques can undoubtedly be transplanted from the more conventional installations to the miniature installations of the slim hole. Other techniques, such as fishing, will probably have to be developed, and special miniature tools will have to be designed.

Other problems, such as permanent completion, may well be beyond solution in slim hole. If this were true, any argument would be on a purely academic level. As is now true of many conventional installations, it will be cheaper to pull tubing and make conventional repairs and workovers than it will be to make the permanent completion.

One possible objection remains, however. A successful slim-hole installation, it seems, must be a miniature installation throughout. That is, if the casing size is to be reduced, the tubing, gas-lift valves, fishing tools, packers, and wellhead equipment must be reduced accordingly. And it follows that the demand for production capacity must also be reduced. Well C, in Table 1, produced over 300 bbl. of fluid per day through 4,750 ft. of 1¼-in. tubing. That is probably near the top limit for this size tubing and depth of lift. It would seem that the really big fluid producers would be ruled out by the slim hole.

The question of how slim a slim hole can be remains unresolved. Perhaps consideration of drilling rates, mud problems, fishing and other repair and remedial operations will eventually limit the slim hole to 3½ or 4-in. casing. If, however, the problem of artificial lift is to be the limiting factor, then ample evidence is available that the casing size can be reduced to 2½ or 2-in. And the equipment to do the job is already on the market.

How big a drill collar do you need to

Straighten Out Those Crooked Holes?

Here are the results of a study on 82 wells in Gaines County, Texas

by M. M. Brantly,* and Stanley C. Moore†

The first really organized approach to the crooked-hole problem was the theoretical one made by Woods and Lubinski,[1,2,3,4,5] in their work of the past 3 or 4 years. Although their final completed work has only been released 4 or 5 months, reactions are already beginning to show. We cite the very comprehensive study recently reported by Speer and Holliday.[6]

Woods and Lubinski make the following points:

1. The free part of the drill collar string immediately above the bit is a pendulum.

2. The more effective this pendulum is, the greater opportunity gravity has to guide the bit toward vertical.

3. The larger the drill collars are, the more effective they are as a pendulum.

4. A properly placed stabilizer increases the length, and therefore the effectiveness of the pendulum.

5. A reamer placed just above the bit reduces pendulum effect.

6. The greater the deviation angle, the more effective the pendulum becomes.

Conclusions from the accompanying article are that in Russell Devonian field, where deviation is the greatest obstacle to progress, the most important single factor in achieving high penetration rates is apparently a properly designed drill-collar assembly just above the bit. The work of Woods and Lubinski on the effect of drill-collar size and stabilizer placement in deviated holes is the most practical guide for designing this assembly.

WE have chosen to study the drilling deviation encountered in the Devonian wells of the Russell field, Gaines County, Texas, in the center of the Permian basin, for several reasons. In the first place, progress was reportedly impeded in the drilling of 52 of the 82 holes. Even those that reported no trouble, in many cases, ran such light weight from start to finish that fear of a crooked hole might be said to have impeded their progress.

Plotting the 66 troublesome wells on the map (Fig. 1), shows that there is no particular area which might be dubbed good or bad. Thus, when an operator spuds in, his chances are about the same, regardless of locality on the structure. There is no safe "top of the structure" area where formations are flat all the way down. Apparently this is due to the fact that the anticlinal structure dips away in both directions from the fault which bisects the field.

There are three operators so unfortunate as to have apparently drilled into the fault, and had their holes abruptly take off toward "Jones' pasture." (This is literally the case in Russell field because about half the tracts there are Jones' pastures). We desire to further consider the plight of these three unfortunate contractors, and will do so later.

We have graphically illustrated in Fig. 2 the 6-year trend in the days, bits, and on-bottom hours required to drill the oil string hole from 4,500 ft. to 11,000 ft. The improvements which have been made are: 30 per cent in days; 50 per cent in bits; and 31 per cent in on-bottom rotating hours. We attribute the larger improvement in bits to the general trend toward better bits, to the extensive use of tungsten-carbide insert types, and to more efficient utilization.

We limited our study to the 51 wells drilled in 1954 and those to date in 1955 (because of inadequate information on the earlier holes). The 51 wells were drilled by 18 different contractors or operators and by using data from all of them, averages can be considered safe assumptions.

As a starting point, we obtained a complete set of bit records on the 82 wells. These provided information on drilling time and bit performance. The data they included on deviation and bit weights was the best available and complete enough for our study.

The operating people who actually drilled the wells were consulted for accurate descriptions of the drilling assemblies. The next step was to classify each assembly used for drilling these 51 most recent wells. What we wanted to find out was how each of the assemblies would rate on the charts prepared by Woods and Lubinski for evaluating "pendulum effect."

If we could discover that those people who designed their bottom assemblies properly suffered least from crooked-hole difficulties, then certainly the procedure has merit. Accordingly, a system was set up for "rating" each bottom assembly. Fig. 3 and Table 1 show how this was done. Using the Woods and Lubinski charts we attempted to classify each assembly as to its effectiveness as a "free pendulum." How much force back toward vertical would they produce as the hole goes off?

We needed only to consider the size of the bottom two or three drill collars and the procedure for using a stabilizer. Naturally we ran into many cases which were difficult to classify properly. However, as an example, if an assembly belonged in one class with a stabilizer and in the next without a stabilizer—and the stabilizer was used only part time, or in an ineffective manner, we put them somewhere between the two classes.

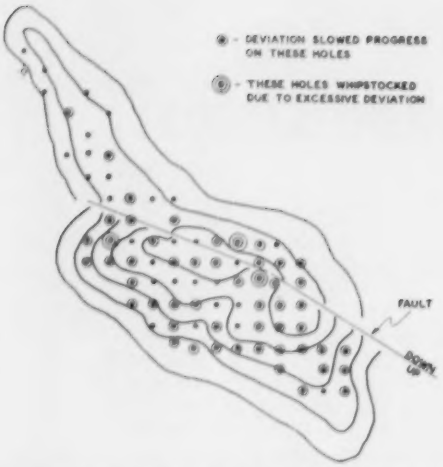
Table 1, in which we classify drill-collar sizes only, was established so we could compare results between different hole sizes. The holes drilled were fairly well divided between 6¾, 7⅞, and 8¾-in. sizes.

Approximately 25 per cent of the bottom assemblies could not be classified from the "pendulum standpoint" because reamers were run a considera-

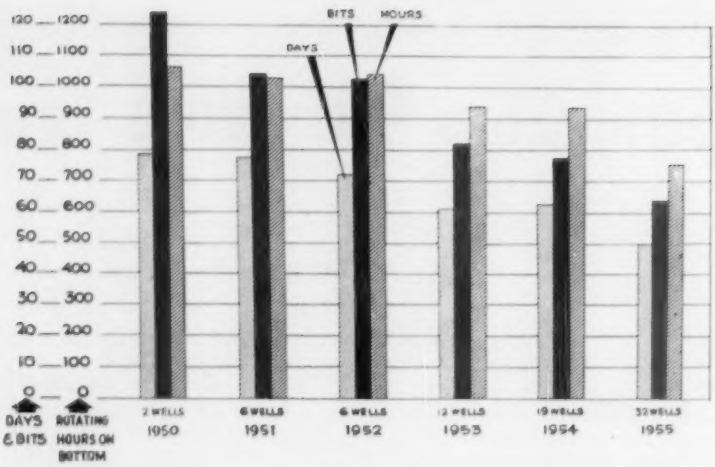
TABLE 1—CLASSIFICATION OF DRILL-COLLAR SIZES

	Size drill collar		
	Small (in.)	Medium (in.)	Large (in.)
6¾-in. hole	4¾	5⅜	6
7⅞-in. hole	5¾	6⅜	7
8¾-in. hole	6¼	7	7¾

*President, Brantly Drilling Co., Inc., and †president, Drilco Oil Tools, Inc. Paper presented at fifteenth annual meeting American Association of Oilwell Drilling Contractors, Houston, September 28, 1955, under the original title, "How Drilling Practices and Geology Affect Penetration."



NO PARTICULAR AREA showed up as being particularly bad, as shown on this plot of 66 troublesome wells. **Fig. 1.**



SIX-YEAR TREND in drilling progress for making oil-string hole in Devonian Russell field. **Fig. 2.**

ble part of the time, or because a "packed hole" assembly was used. The packed-hole assembly had many variations, but in every case it was intended to guide the bit in a straight path, with little help from gravity or pendulum effect. We will, however, show how these operations compared with others.

Having decided who had good assemblies and who did not, we faced the really vital question of who had crooked-hole troubles and who did not. Although there were very few holes that went out to contract limits, some of the fastest holes drilled might be termed crooked by some, in that the deviation reached 3° or 4°. Furthermore, some of the slowest holes were relatively straight.

We might as well get around to saying what we mean. The men who came closest to solving the crooked-hole problem in this area were those who were able to drill the fastest hole without exceeding contract deviation limits. After all, every operating man consulted agreed that the greatest obstacle to a fast hole in Russell Devonian field is the danger of getting crooked. So we have considered the rate of penetration as the best measure of success in combating crooked hole.

Further, it might be said that the results we obtained are expressed more in terms of how to drill a fast hole in a crooked-hole area.

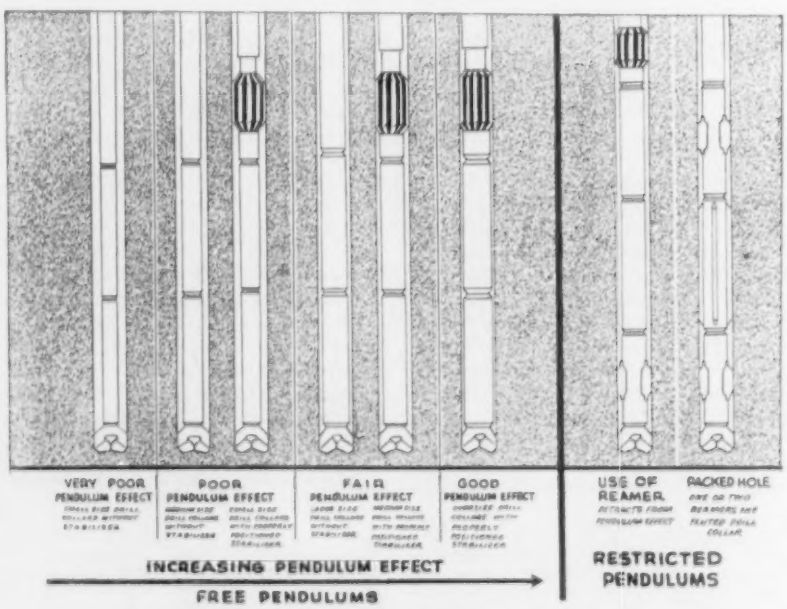
A real effort has been made to insure the accuracy of our rate-of-penetration data and our method of classifying bottom assemblies. We consider the most significant result of our study to be the graphical analysis of drilling speed as related to type of bottom assemblies shown in Fig. 4. Bearing in mind that all of the wells considered have been drilled in the past 18 months, that most influencing factors such as mud programs and bit types have varied very little, and that hoisting and lost time do not affect the data, it seems quite apparent that the type of bottom-hole assembly has great bearing on ability to achieve high rates of penetration.

Admittedly, heavier weights were run with the better assemblies. We consider the design of the assembly to have made this feasible under the circumstances. It was not a lack of available weight which caused the slow rates of penetration, because many of these holes were started with 22 to 30 drill collars in the string.

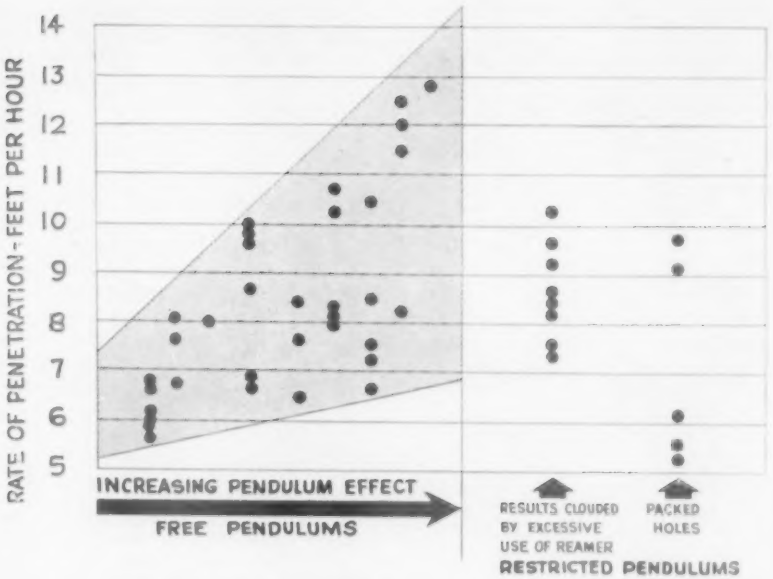
Referring again to Fig. 4, it is evident that a well-designed bottom assembly does not guarantee a fast hole. It merely makes one possible. On the other hand, a poor assembly seems to be a pretty good guarantee that a fast hole cannot be drilled.

The wells shown on the graph under the "Results Clouded by Excessive Use of Reamer" column were not included under the pendulum column because we simply did not know how to classify them. Their inclusion, however, would not have affected the appearance of the pendulum chart. Most of the reamers were used only part of the time, and then usually in conjunction with stabilizers.

Of interest are the five holes drilled with packed-hole technique. In each case a combination of reamers and



METHOD OF CLASSIFYING bottom assemblies. **Fig. 3.**



BOTTOM-HOLE assemblies influence penetration rate. Fig. 4.

fluted drill collars was used as indicated in Fig. 3. Although the drilling rates were only average, and in three of the five instances the fluted collar was laid down before finishing the hole, they seem to have served their purpose by limiting the rate of deviation change very well.

Another approach to the evaluation of the various assemblies was to study the "deviation patterns" obtained by plotting deviation vs. depth. In Fig. 5 we have plotted these for the six poorest-rated pendulums, the six in the center of the pendulum chart, the six best pendulums, and the five packed holes. There is a striking difference in the appearance of these patterns. For the poor pendulums the deviation curve fluctuates violently, indicating the instability of such assemblies. In effect these are foreshortened pictures of the hole and a thoughtful study brings to mind such things as key seats and possible difficulties in getting casing down —and perhaps production difficulties at a later date.

The fair pendulums show some improvement in leveling off the violent fluctuations, and the patterns for the good pendulums seem quite smooth by comparison. The packed holes also produce relatively smooth patterns. Sizing up all of the deviation patterns it is evident that the most desirable results were most consistently obtained with the properly designed bottom assemblies.

Let us consider the actual assemblies that made up these poor, fair, and good pendulums. Note that all six of the poor assemblies were used in 8¾-in. hole. This is logical, because had these same rigs been assigned 7⅞-in. holes to drill, the same drill collars would have been used and the assembly would have had a better rating. These 8¾-in. holes were all drilled with 6 and 6¼-in.-o.d. drill collars and stabilizers were run only part time. By our standards these collars rated "small" and the pendulum would have been considered poor even if stabilizers had been correctly utilized. The average drilling weight recorded was only 26,000 lb. or 3,000 lb. per inch of bit diameter. Even so, note how drastically deviation varied. In many cases fluctuations in deviation were either the cause or effect of equally drastic fluctuations in drilling weight. The average drilling rate for these holes was 6.0 ft. per hour.

Note that one of the patterns under "Fair Pendulums" is for an 8¾-in. hole, which went out slightly beyond 5°. Records indicate that medium-size drill collars were used on bottom, in this case 7-in. o.d. and stabilizers were also used. However, a reamer was in use just above the bit when the hole went out beyond 5°. Even so, the rate of penetration was higher than for the six holes drilled with 6 and 6¼-in.-o.d. drill collars.

Other assemblies listed here as fair were, in the case of one of the 7⅞-in. holes; a 7-in. drill collar on bottom, then one 6-in. drill collar, then a stabilizer and then 20 more 6-in. drill collars. Another assembly rated "fair" for 7⅞-in. holes included stabilizers at all times placed at 60 ft. and 120 ft. above the bit and used 7-in.-o.d. drill collars below the lowest stabilizer to about 8,000 ft. where they were replaced with 6¼-in.-o.d. drill collars.

Operators were able to use an average of 4,200 lb. weight per inch of bit diameter when employing the "fair assemblies," and the average drilling rate achieved was 8.2 ft. per hour.

Assemblies classified as good in 7⅞-in. holes used 6¾ or 7-in.-o.d. drill collars on bottom, ran a stabilizer 60 ft. above the bit, and used a reamer very little of the time. Good assemblies for 6¾-in. hole included 5¾-in.-o.d. drill collars on bottom with a stabilizer at 60 ft. With these properly designed assemblies the average weight employed was 5,200 lb. per inch of bit diameter.

The fastest hole in the group was made with 7-in.-o.d. drill collars on 7⅞-in. bits with a stabilizer at 60 ft. It should be pointed out that this is the only hole in which clear water was used to 10,700 ft., whereas the usual practice is to mud up at about 9,200 ft. However, a study of the progress of this hole to 9,200 ft. indicates that it would have been among the three fastest anyway. Drilling weight used averaged 50,000 lb. and sometimes was as high as 60,000 lb. The average weight per inch of diameter was 6,400 lb. Penetration rate was 12.8 ft. per hour.

We consider it significant that the six fastest holes followed the recommendation of Woods and Lubinski fairly well. On two of the holes the stabilizers were initially placed 30 ft. above the bit and then moved up to 60 ft. when the hole went beyond 2°. Even so, this means that the theory was employed to increase pendulum effect when it was needed.

Proper Stabilizer Position

We note that there is disagreement as to the proper stabilizer position. Woods and Lubinski's theoretical approach indicates that it is extremely critical. The recent work of Speer and Holliday in California indicates that relatively good results can be obtained within wide intervals, sometimes ranging from 45 to 110 ft. from the bit to the first stabilizer. Of course there may be some fundamental difference between California formations and their 300 r.p.m. and the corresponding factors in Russell field in West Texas. Here the formations are much harder and the rotary speeds only 20 to 25 per cent as great.

We agree with Lubinski and Woods, that for practical considerations the stabilizer should be placed approximately 10 per cent closer to the bit than the calculated ideal position. But we also feel that almost as much benefit can be gained with the stabilizer as much as 20 per cent closer than the ideal position. This reasoning is based on the fact that stabilizer fixes the point at which the top of the pendulum rests against the wall of the hole. Without

"Disappointments in attempting to use the new approach usually arise from (1) exceeding theoretical capacity of tools to drill straight, (2) failure to consider both drill-collar size and stabilizers, and (3) incorrect stabilizer treatment."

the stabilizer this point varies widely as the wall is neither a true or perfect cylinder.

It so happens that for most of the calculated positions for placement of stabilizers in drill-collar strings used in Russell field, the range is 60 to 80 ft. above the bit. So, for practical considerations, the stabilizer is usually placed 60 ft. above the bit. One operator drilled two wells using subs to place the stabilizer at exactly the ideal position and did not do as well as on the previous and following wells where the bottom stabilizer stayed 60 ft. from the bit. However, the 60-ft. placement conforms fairly well with the theory.

Findings From Study

All too often we find a beautifully designed and engineered drilling rig, costing perhaps $400,000, using a string of drill collars worth perhaps $5,000. In Russell field one can compete better with a $200,000 rig and a $25,000 string of drill collars.

Our findings substantiate the proposition that, where deviation is the limiting factor, twice as much weight can be run in 8¾-in. hole with 7¾-in.-o.d. drill collars on bottom as can be run using 6-in.-o.d. drill collars on bottom. It is true that twice as much weight may not be as much as the operator may wish to run. For example, an increase from 10,000 lb. to 20,000 lb., whereas 50,000 lb. would be desirable.

Disappointments in attempting to use the new approach usually arise from:

1. Exceeding the theoretical capacity of the tools to drill straight.
2. Failure to consider both drill-collar size and stabilizers.
3. Incorrect stabilizer placement.

Recommendations . . . It is likely that, as work progresses on the design of bottom-hole assemblies, some standard procedure for appraisal or rating of such assemblies may be desirable. All too often we find an operator using a combination of drill collars and stabilizers, and perhaps reamers, which he thinks is good, but actually is not. This accounts for many disappointing results.

In our study of Russell field data we noted that higher penetration rates were often attained with these better stabilized bottom assemblies, at the same recorded weights. This possibility has often been advanced previously where very heavy weights are used. The theory is that the bit can be expected to perform better if it rotates about a straight and uniform axis. A 6-in. drill collar slapping the wall of an 8¾-in. hole, 15 ft. above the bit, causes alternate cones to advance as much as ⅛ in. ahead of the others and possibly carry all the weight momentarily. It is easy to visualize that such "sloppy" action might be very harmful to bits under heavy loads. We think an investigation of this behavior independent of crooked-hole considerations may produce very worth-while results.

Considering again the plight of the three contractors who ran unsuspectingly into the subsurface formation faults and wound up with expensive whipstocking jobs, we observe that the same thing has happened in possibly 10 or 15 other cases the past year in the Permian basin. In these instances the contract limits were far exceeded in the course of running one bit. This placed an undue hardship on the contractor because most contracts specify a deviation reading every 200 to 500 ft., or at the end of each bit run, whichever is less. This is considered good practice and it is felt that there is a partial responsibility on the part of the operator if a large deviation is experienced.

With conditions as they are today, these risks are too great for the contractor to assume. It would appear logical that if the contractor were protected against loss against such unavoidable conditions the operator would be ahead in the long run. Such severe conditions do not occur very often, but the prudent contractor must theoretically protect himself against such an occurrence by placing a cushion in his contract price.

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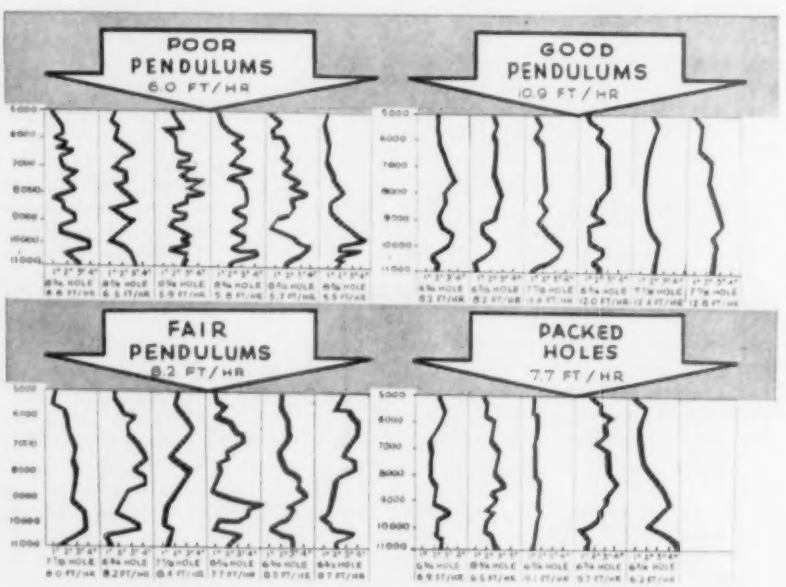
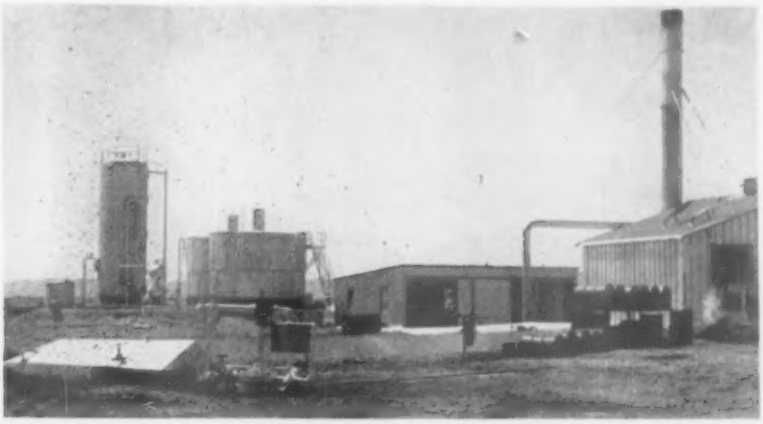


DEVIATION PATTERNS for various bottom assemblies. Fig. 5.



A STONE'S THROW from the Nevada discovery well (foreground) is the heating plant, sheltered pumping setup, and crude treating and storage facilities.

AT TEMPERATURES of 90° F. or less, the waxy crude can be picked up like a mat.

TO KEEP crude from solidifying in the upper well, heated oil for the free pump is run to the well inside an insulated, heated steel shed.

EXTENSIVE use of heat and insulation is also required on the tanks. Insulation and steam coils keep the stored oil fluid.

How to keep a "buttery" crude moving

by D. H. Stormont
District Editor

THE crude that Shell Oil Co. produces from two wells in eastern Nevada (the state's first commercial oil production) is not like conventional crudes.

At temperatures of 90° F. or less, it ceases to be a liquid and assumes the consistency of cold butter. It has a gravity of 28° but it contains about 35 per cent wax. Keeping it from congealing in the well, flow lines and tank battery—and during its truck trip to Salt Lake City—poses quite a problem.

The first well, Shell's Eagle Springs Unit, drilled through 6,600 ft. of alluvial overburden before being completed in a volcanic lava zone for an initial production of 400 bbl. daily. The second well, 1,800 ft. south, drilled through a similar thickness of overburden and was completed for 500 bbl. daily in a highly fractured limestone pay.

Heat and free pumps needed . . . Initially, the discovery well was equipped with an air-balanced beam pumping unit. Soon the unit could not handle the high pour-point crude, which would congeal near the surface and seize the rods.

A Kobe 2½-in. casing-type free pump has solved the problem. Heating the power oil to 140° F. introduces enough heat down the hole to keep the crude from solidifying. Thus, when the second well was completed, it was equipped with a 3-in. free pump.

Some 6-months' experience has proved the crude to be exceptionally good power oil. It is free of sand and the

necessity for heating simplifies the problem of emulsion treating. During this period the pumps have been surfaced some 50 times so that bottom-hole pressure bombs could be run.

The crude's high pour-point dictates further heating after it reaches the surface. Accordingly, Shell has erected a heating plant near the discovery well. An insulated metal shed over the lines keeps the crude and power oil from congealing in the lines. A closed steam coil heats the inside of the 100-ft. shed.

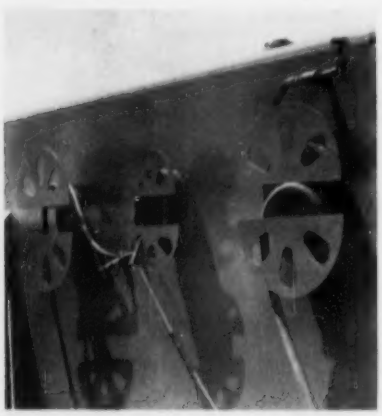
This arrangement was not practical on the second well, 1,800 ft. away. To supply heat to this well, a 1-in. hot-water line and a 1¼-in. power-oil line run inside the 4-in. flow line. These inside lines are packed off at each end of the 4-in. line with couplings which permit differential expansion between the outer and inner lines.

Water at 200° F. circulates in the 1-in. line and power oil enters the intake line at 140° F. These two lines kept the well's crude production in a fluid state during the coldest days of the past winter when temperatures fell to as low as 38° F. below zero.

Output from the two wells, held to 300 bbl. daily, is trucked to Salt Lake City. Heating coils inside insulated tank trucks keep the crude warm during its 300-mile trip.

Acknowledgement

Appreciation is expressed to Kobe, Inc., for supplying the accompanying photographs.



Here's a neat arrangement!

SHELL OIL CO.'S Rig 14, now working near Lovington, N. M., has this neat arrangement for keeping hose and cables secured. Mounted on the side of the portable-generator building are these circular brackets for, left to right, electric cable, air hose, and water hose.

How to keep polished rods lubricated

WHERE wells head and flow, it is difficult to keep the polished rod lubricated because at times no liquid will be passed for several minutes. This is particularly harmful since the packing nut must be kept tight at all times to prevent oil and gas from blowing out when the well flows. If lubricant is not kept on the stuffing-box rubbers, they will get hot and soon burn out.

On Walter L. Plemmons' Minnie Doss lease near Graham, Tex., the pumper uses a short piece of 12-in. pipe welded to the top of the packing gland for a lubricant reservoir. It keeps lubricant on the packing even when the well is pumping back up. Whenever the well makes gas, the oil in the reservoir keeps the polished rod from becoming dry. A hose connected near the top carries excess crude from the well head in case the packing should leak.

Linking valves assures correct tests

THESE mechanically linked three-way valves route the flow of crude oil from well headers to test separators. The mechanical linkages, used by Shell Oil Co. on their Big Mineral tank batteries in Grayson County, Texas, prevent incorrect routing of oil during well tests.

Normally, the flow from all wells producing from the same zone in this field is routed to well headers and then to one common separator. Automatic metering provides a way of keeping track of the zone production.

However, tests of each producing well must be made periodically. There are only one or two small test separators on each tank battery. As a result, piping and valving is provided to use the same separator to test a number of different wells.

Wells are first turned into the test lines at the well header. The piping shown links three different well headers to one separator. One branch is taking the oil from the headers to the test separator, and the other branch returns it to the headers to be metered with the rest of the oil from the same zone.

The four legs in the foreground are the lines to and from two different headers. Lines to and from the third header are buried under the three-way valves in the background.

Because of the linkages, turning the valves to open one header line to the separator, automatically opens the return line to the same header. Lines from the other two headers are automatically closed by the same turning of the valves. The flow of oil can't be crossed up, and a true test of each well opened into the header line is obtained.

JOB IMPROVEMENT FOR THE PROCESS FOREMAN—26

Here's What Isn't True About Centrifugal Pumps

1. Highest discharge pressure indicates a pump is pumping the greatest possible volume. This is false.

Highest discharge pressure comes when the discharge valve is completely closed or near closed (with case full of liquid) and very little or nothing is being pumped. Some pumps possess such characteristics that the discharge pressure rises slightly when the discharge valve is first cracked.

As the valve is further opened, the pressure will hold constant and then start to decrease. It continues to decrease as the discharge valve is opened until pipe friction or a control valve restricts flow enough to be a factor. This means that even though the discharge pressure of a pump may be lower than normal, it does not necessarily mean that it is pumping less—it may be pumping more.

2. Pump should be started with the discharge valve wide open to hold the load down on the motor. This is false.

The effect of shutting the discharge valve from full open to full closed is a reduction of power about 50 per cent.

3. No matter which liquid is being pumped, a centrifugal pump will put up the same discharge pressure. This is false.

This pump (running at the same speed) will produce the same feet of head of different liquids, but this same feet of head of different-gravity liquids will result in different discharge pressures. This would mean that if water were pumped in a gasoline pump, the discharge pressure would be about 50 per cent higher—the density of water is about 50 per cent higher than gasoline.

Courtesy of Phillips Petroleum Co., refinery department.

This principle can be shown by placing a block of wood at the end of a 3-ft. cord and swinging it in a circular motion—and then replacing the block of wood with a block of concrete the same size and swinging it at the same speed. The centrifugal pull on the string when the concrete block is being swung is much greater than when the wood is being swung. If we were able to convert this force to liquid pressure, the "concrete pressure" would be twice as much if the density of the concrete is twice that of wood.

If we compare this experiment with the "particles" of water being "swung" in the gasoline-pump impeller, we can see why water produces 50 per cent higher discharge pressure than gasoline.

One of the precautions necessary when changing the service of a pump is to check driver horsepower. Pumping the same volume of a heavier fluid requires more horsepower. (The horsepower requirements are directly proportional to the fluid density).

4. The volume of flow should be regulated with the suction valve. This is false.

This should never be done. The suction valve should be operated wide open and the flow adjusted with the discharge valve if this type regulation is necessary.

5. **A pump should leak a little at the packing head to keep it well lubricated.** This is false.

The designers of pumps and packing make this unnecessary. Leakage at the packing can only be charged to waste.

6. A large-horsepower motor will cause a pump to pump more. This is false.

The volume which a pump will pump depends upon the speed of the driver as discussed in the above.

7. A centrifugal pump can be run indefinitely with a closed discharge. This is false.

As soon as the liquid (and thus the case) heats up due to friction produced by the rotation of the impeller, the discharge valve must be opened or the pump shut down.

Of course, the discharge valve should not be closed off longer than necessary at any time. When a pump is being started up, the discharge valve should be slowly opened soon after normal speed and discharge pressure are attained. If it is necessary to close the discharge while in operation, shut the pump down or reopen the valve as soon as the case heats up.

8. Pumps operate at greater power efficiency when run above rated capacity. This is ordinarily false.

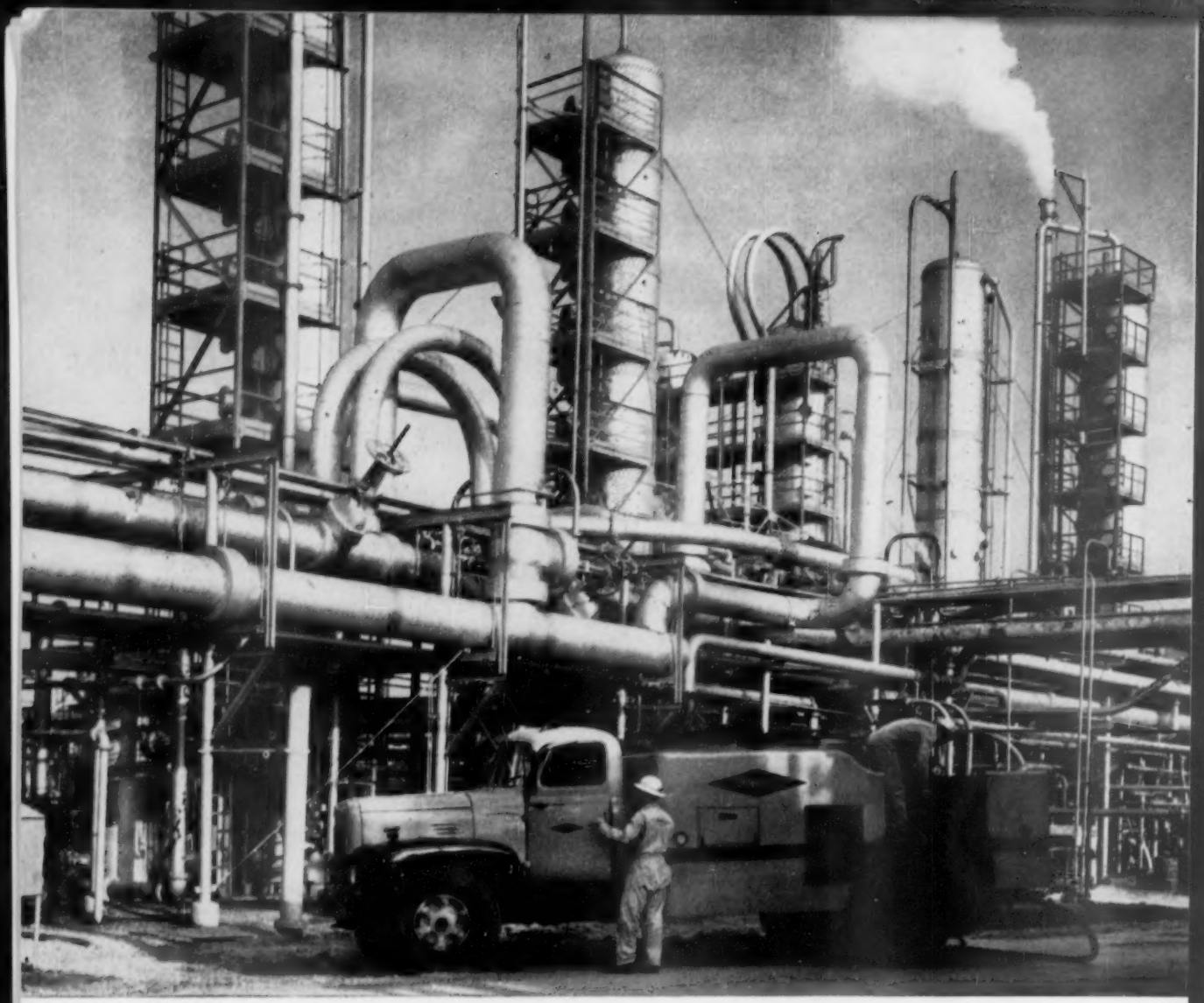
Most pumps are purchased and thus designed for the greatest efficiency at a certain specified volume and feet of head. When this is exceeded, the power efficiency drops. For example, on one pump which was running at 30 per cent overload, the power efficiency fell 12 per cent.

9. Pumps will not pump when they are run in reverse rotation. Generally this is false.

This depends upon the design of the impeller. Many pumps will pump when turning in reverse, but of course will neither produce normal discharge pressure nor produce near normal efficiency.

10. All packing glands of centrifugal pumps in the refinery have suction pressure against them. This is false.

Part of them have suction pressure against the glands and part have discharge pressure.



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by N. R. Vaswani

New Correlation for Flashed Products Composition—2

T.B.P. correlation . . . A. Kobayashi[1] correlated the distillation characteristics of flashed products with the slope of the T.B.P. curve of the feed. He developed an equation to prove that, for a given feed composition, the percentage distilled at some given temperature T on the T.B.P. curve of the vapor obtained in an equilibrium vaporization is a function of: (1) the percentage distilled at this same temperature T on the T.B.P. curve of the feed; and (2) the per cent going overhead in the E.F.V.

Using his own data obtained at the University of Tulsa and also previously published data (Leslie and Good, and Fancher), Kobayashi developed a series of charts correlating the distillation characteristics of flashed products with the T.B.P. slope of feed. Since most of his distillation data did not extend to 70 per cent, he arbitrarily chose a 10-40 per cent slope instead of the customary 10-70 per cent slope.

To extend the range of T.B.P. slopes for this correlation, the author selected these stocks:

Stock—reference—	T.B.P. slope of feed 10-40 per cent
Kerosine, Stoddard solvent blend—Kobayashi	1.2
Gas oil, Stoddard solvent blend—Kobayashi	1.3
Mid-Continent gas oil (22)—Edmister	2.3
Naphtha-kerosine-gas-oil blend	3.46
Naphtha bottom (21)—Edmister	4.22
Treated pressure distillate (18)—Edmister	5.16
Pressure distillate (20)—Edmister	5.2
Guara crude—Kobayashi	6.1
Pressure distillate—Fancher	6.3
Mid-Continent gas oil (25)—Edmister	6.45
Naphtha-kerosine blend (27)—Edmister	6.74
Cabin Creek crude—Leslie & Good	6.9
Mid-Continent crude—Fancher	7.3
California crude—Fancher	7.6

Numbers in parenthesis refer to stocks listed in Edmister[2] data.

This correlation was prepared by the author while he was fulfilling requirements for an M.S. degree in petroleum refinery engineering at the University of Tulsa.

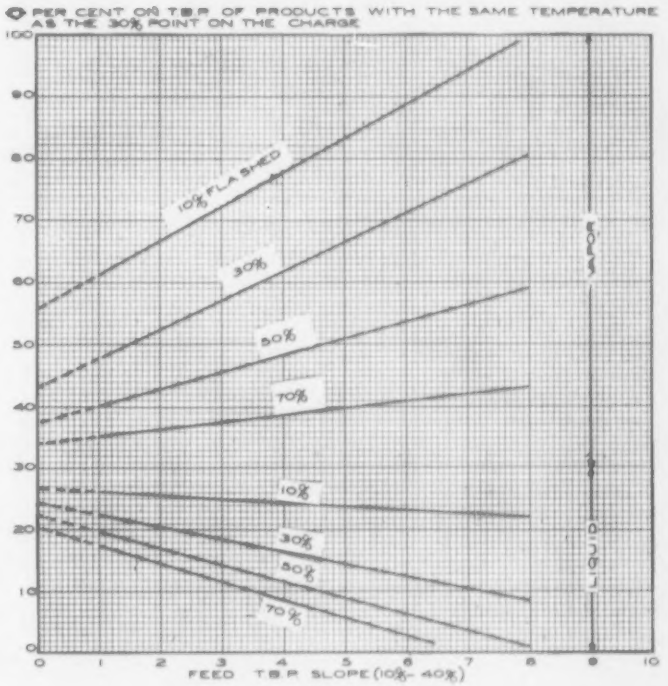

Fig. 3.

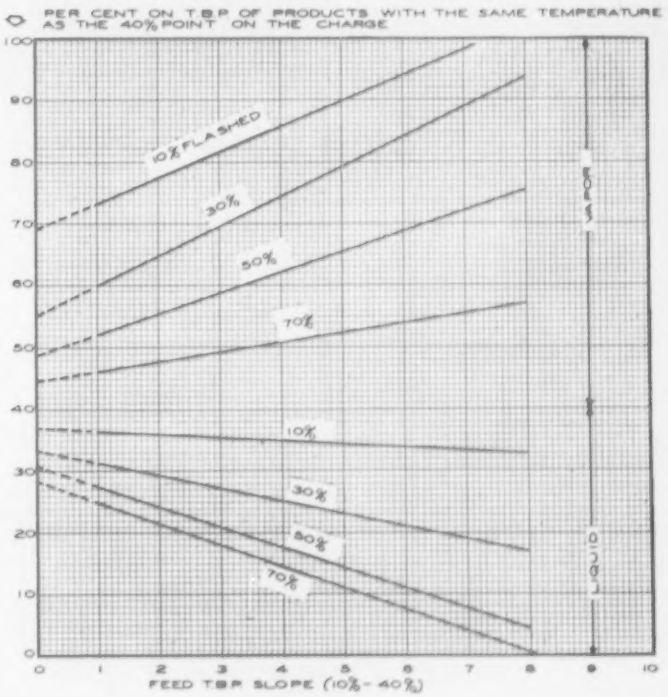

Fig. 4.

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Maintaining Slush-Pump Fluid Ends—7

NEW valves, new seats, and new guide bushings should be installed at the same time for best results.

Proper installation of the valve seat is of utmost importance if washouts, as shown in Fig. 9, are to be avoided. The mating taper surfaces of the valve seat and of the seat bore in the cylinder must be cleaned of mud, scale, and grease and all surface imperfections must be removed.

After washing both surfaces with solvent to remove the last traces of grease and oil, the seat should be driven with a driving tool and sledge, the driving tool fitting into the valve-pot bore.

Seat removal . . . Special pullers are the best means of pulling valve seats. In extreme cases, very tight seats may need to be cut with a torch. In doing this, it is essential that the torch-cut slot does not reach the tapered bore of the valve pot. Damage to this surface leads to by-passing of fluid and severe damage to the cylinder.

Factors affecting service life . . . Assuming that the valves and seats are of proper design and quality, short service life is usually due to abrasives in the mud, use of clear water as a drilling fluid, lost-circulation materials between the valve and seat or the valve and disk, hammering of the pump due to insufficient filling, failed valve disks, and worn guides and upper guide bushings.

This material taken from Tool Pusher's Manual, A.A.O.D.C. Originally prepared by J. V. Mahan, National Supply Co., Pittsburgh.

Usually, the first failure is in the valve disk. If it is not immediately replaced, this can lead to cutting of the valve, the seat, and even the bore in the pump cylinder. It is important to inspect the valves frequently, replacing the relatively inexpensive disks where any signs of failure are observed. If there are any sands or lost-circulation materials between the valve and disk, this should be removed.

After such an inspection, each valve should be replaced in its original valve-pot location to avoid any mismatched wear. For the same reason, new and old valves and seats should not be assembled together.

Worn guide bushings can cause cocking or even sticking of the valves. Guides worn out-of-round or to more than about ⅛-in. clearance should be replaced.

Uneven tightening of stud nuts on heads and covers as well as other assemblies is a common bad practice. It leads both to stud failures and failures of the connected parts. Proper tightening is most critical on cylinder head and valve covers which use a type of packing which does not permit metal-to-metal contact.

In any event, the proper procedure is to tighten the nuts in a criss-cross fashion, as shown in Fig. 10, wrenching them in this order: 1-5, 2-6, 3-7, 4-8, 1-5, 2-6, etc. Nuts should be tightened in several steps around, pulling the parts together progressively and evenly.

If one stud breaks, and particularly if it is not immediately replaced, it is likely that fatigue cracks will have started in the adjacent studs or even the entire set. To avoid a continuing series of difficulties, it is often wise to replace the other studs.

Studs have a tight end for the permanent fit in the body, and a loose end for the nut. Be certain they are installed in the correct manner and screw them all the way in.

Clean oiled studs and nuts facilitate operations and contribute to long life. Corrosive materials in the mud, when left in contact with stud threads, often cause corrosive fatigue.

Preventive maintenance . . . Worn parts, loose connections, clogged pipes and strainers, and inoperative rod oilers all contribute to increased wear. A clean, well-maintained pump usually contributes to improved experience with fluid-end parts.

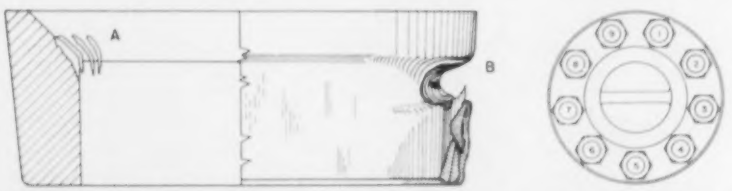

FIG. 9 (left)—A is the result of disk valve failure; B is the result of poor installation in the pump. FIG. 10 (right)—To tighten cap and head nuts most effectively, follow this pattern: 1-5, 2-6, 3-7, 4-8, 1-5, etc.

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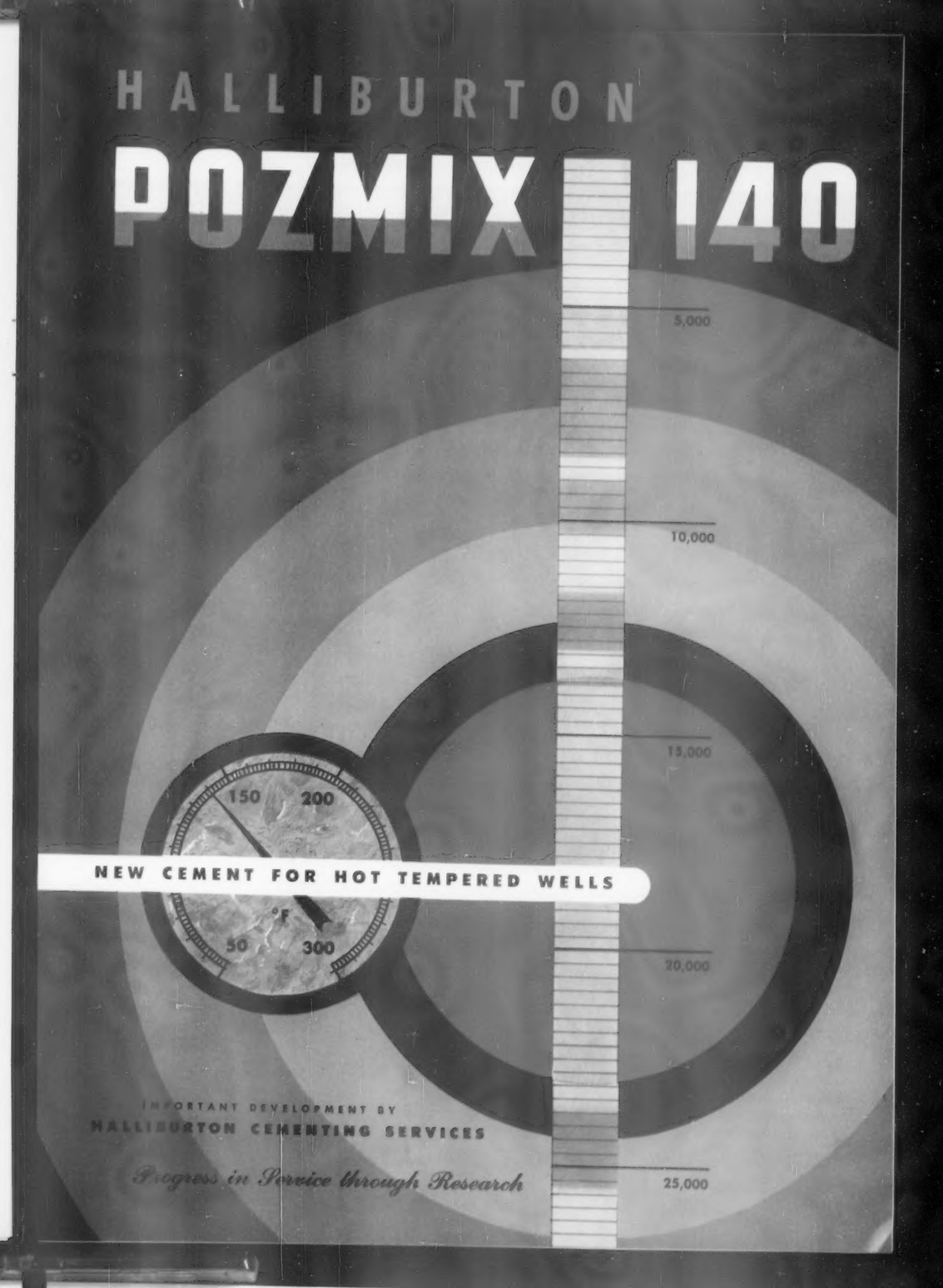

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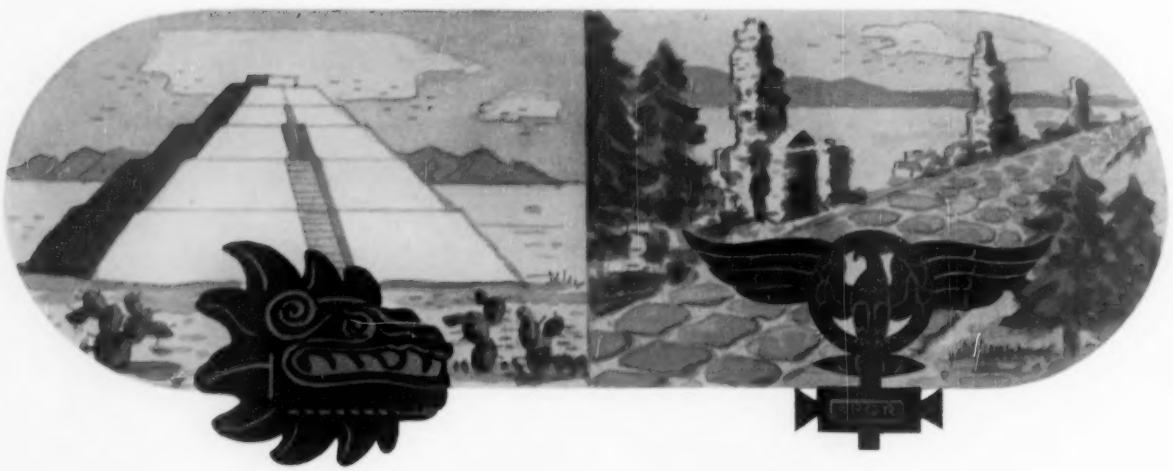

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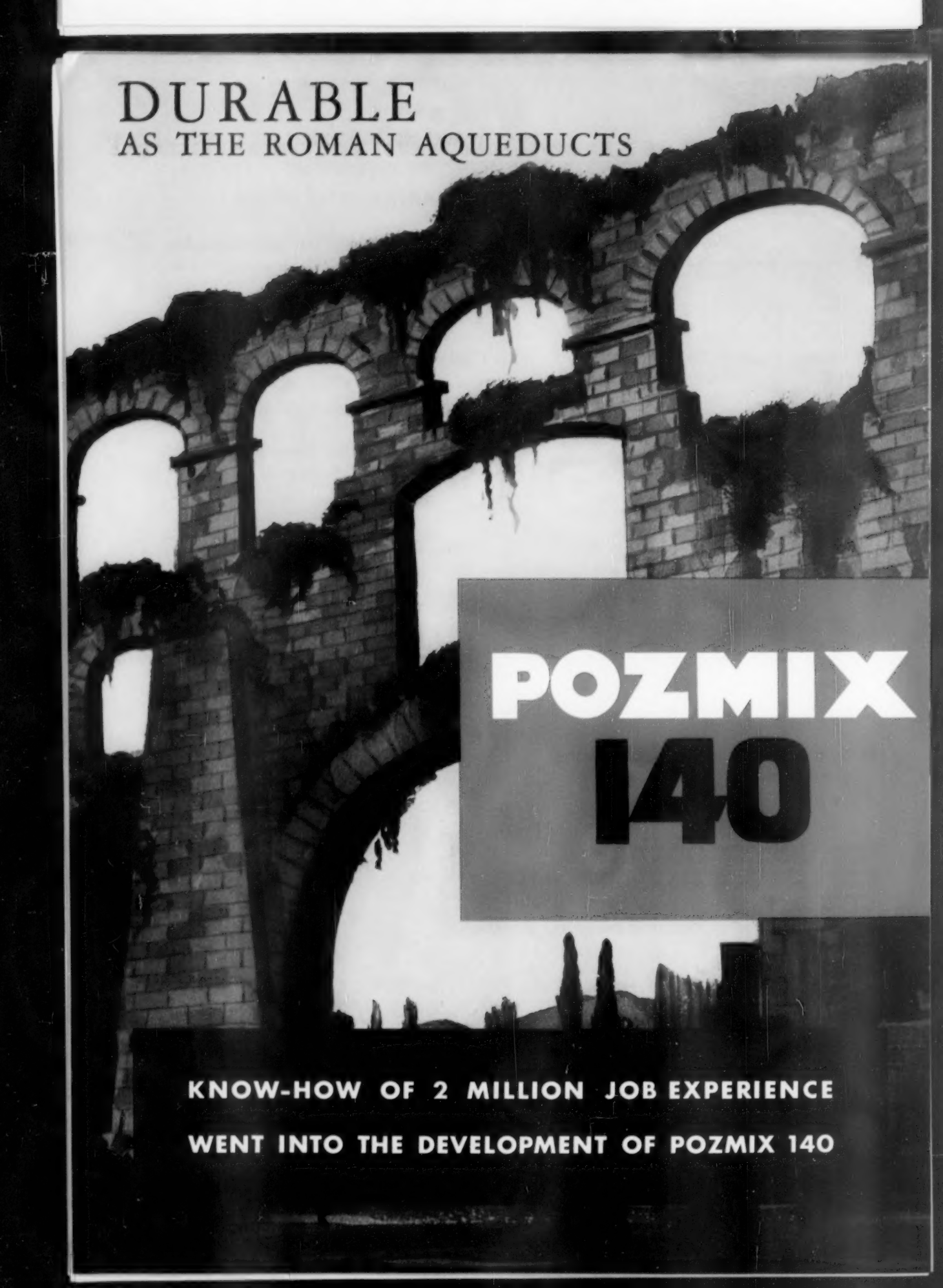
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ELECTRIC LOGGING—65

Using Logs to Indicate Produced Water Sources

by R. I. Martin

FIG. 1 illustrates the problems which may be experienced in log interpretation. The log is from a wildcat well, and the depths are so great that no coring has been done. Consequently, testing has to be based on information provided by the log.

In this particular well, sands which are probably salt-water bearing are present about 100 ft. above and below the portion of the log shown in Fig. 1. They have resistivities of 0.6 ohm-m, which are low enough to suggest that their fluid content is likely to be salt water.

The maximum resistivity recorded by the 64-in. normal is 2 ohm-m, and with mud resistivity of 0.2 ohm-m, this value should be close to the true resistivity. This higher resistivity than the upper and lower water sand makes the sand from 12,835 to 12,860 ft. worthy of more consideration. A resistivity index of 3 may well indicate dry production if the sand is shaly.

Reference to the S.P. curve shows low values at the top of the sand so that it is probably shaly. Consequently, the sand should be tested because it appears to offer prospects of production.

Since the primary cement job was unsuccessful, the first test made was from 12,870 to 12,874 ft. The resistivity here is very little higher than that of the probable water sands. The well flowed salt water from these perforations. This shows that the low resistivity is due to salt water even if this production was obtained from the lower water sand by way of the annular space. Cement was squeezed through these perforations.

A second test was made from 12,850 to 12,858 ft. which gave 6,700 M.c.f. of gas per day with no salt water.

After perforations from 12,834 to 12,844 ft. were shot, the well produced 30 per cent salt water. Since Test 2 was dry, this water is probably from above. Both sets of perforations were squeeze-cemented.

The same intervals were reperforated and the well flowed 50 per cent salt water.

The sixth perforations were from 12,834 to 12,847 ft. and the well produced 10 per cent of salt water initially.

More direct and satisfactory results could have been obtained. In place of Tests 2 and 3, an upper squeeze job should have been done above the sand and the interval 12,840 to 12,850 ft. opened to production. Both the S.P. curve and Micro-Log show that there is little chance of obtaining production from above 12,840 ft. A very probable oil-water content at about 12,860 ft. limits the lower depth of the perforations.

It is true that perforations at 12,834 to 12,847 ft. produced some salt water, but the previous squeeze jobs carried out through two sets of perforations may not have been effective in shutting off top water.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy, Rolla.

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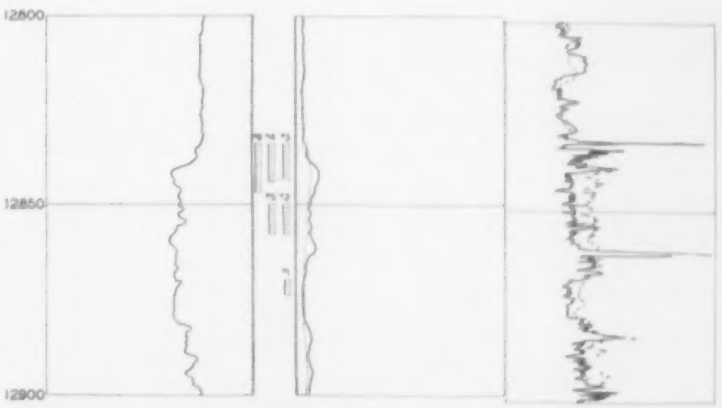

Fig. 1—Upper and lower perforations yielded salt water while production from middle perforations was dry. The logs indicated that water from sands above was probably channeling down to upper section.

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Getting Ready to Go Under Water

Seattle Gas Co., which is getting ready for the arrival of natural gas into the Pacific Northwest, has already begun work on its system. Workers here are spraying a coating of concrete on a 512-ft. section of line to be laid under the West Waterway. The line is first wrapped with coal-tar enamel and fiber glass for protection against corrosion. The line was then wrapped with a wire mesh to reinforce the concrete. The pipe weighed 40 tons when it went into the water.

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by • preceding the job.

Crude-Oil Pipelines

• **Big Horn Pipe Line Co.** — Firm has asked Wyoming Public Service Commission for permission to build a 150-mile, 8-in. crude-oil line from Ash Creek field, Wyoming, to a connection with Service Pipe Line Co.'s line at Midwest, Wyo.

Butte Pipe Line Co.—This jointly owned company of Shell Oil Co., Murphy Corp., and Northern Pacific Railroad has let contracts for its $18,000,000 crude-oil line from southeastern Montana to Guernsey, Wyo. Contractors and their spreads are:

Anderson Brothers Corp., Houston, 82 miles of 10-in. and 6½ miles of 12-in. from Glendive to Poplar, Mont.

Associated Pipe Line Contractors, Houston, sections 1 and 2, totaling 227 miles of 16-in. from the Montana - Wyoming state line to Guernsey.

O. R. Burden Construction Corp., Tulsa, 88 miles of 16-in. from Alzada, Mont., to Cabin Creek field near Baker. Company also has 15 miles of 12-in. in this area.

• **Malco Pipeline, Inc.**—Company is planning a 40-mile, 4-in. line from South Blanco Tocito field in Rio Arriba County, New Mexico, to Bloomfield, San Juan County, New Mexico. Completion set for 1955.

• **National Co-Operative Refinery Association.**—Company will begin building soon a 30-mile, 8-in. line from Lyons, Rice County, Kansas, to its refinery at McPherson, Kans.

• **Pasotex Pipe Line Co.**—Company will substitute 20-in. pipe on 70 miles of its two 8-in. lines from Wink to El Paso, Tex. The project will increase crude-oil deliveries to El Paso by 10,000 bbl. daily. After this job is finished, Pasotex could convert the remaining sections to 20-in. line to make 200,000 bbl. daily available at El Paso. In an emergency, Pasotex could give enough crude to Southern Pacific Pipe Line Co. at El Paso to supply the West Coast until another crude line could be built.

Salt Lake Pipe Line Co.—Company plans to build 165 miles of crude line from Rangely, Colo., to Salt Lake City. The firm said that if the job is started this year it would have to be finished in 2 or 3 months. The line will parallel an existing one.

• **Union Oil Co. of California.**—Company proposes to build an 815-mile line from Rifle, Colo., to Los Angeles to carry the products from its proposed Rifle, Colo., shale-oil plant to the Los Angeles refining area. The line would cost approximately $56,000,000.

• **U. S. Defense Department.** — Defense officials are considering a 97-mile, $8,000,000

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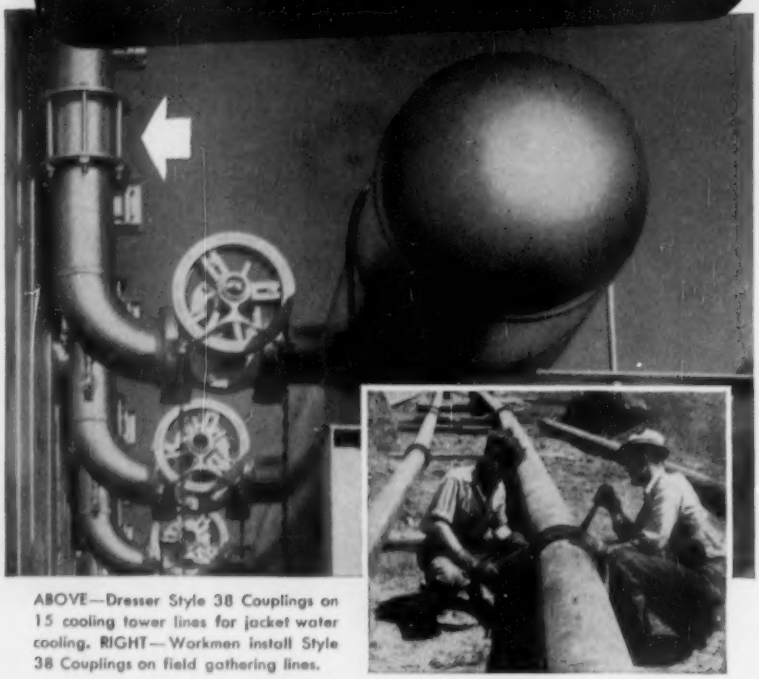

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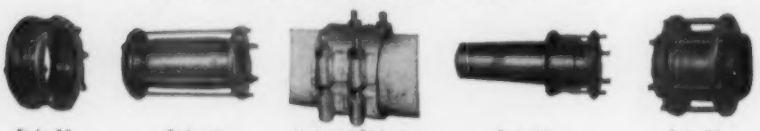

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Pipeline Patrol

line from the Elk Hills Naval Reserve in California to the Los Angeles refining area.

• **West Coast Pipeline Co.**—The off-again-on-again plans for this crude line from near Wink in West Texas to near Norwalk in California are presently before the Office of Defense Mobilization. A three-man board of nonindustry members recently recommended that the project be dropped. They questioned the ability of West Texas to produce enough crude to supply both the East and West Coasts in time of war. The three-man board favored building a line from California's Elk Hills Naval Reserve to be held in standby for possible future need.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

• **H. W. Bass & Sons, Inc.**—Company is planning on a 152-mile, 4-6-in. L.P.G. line from Goliad Corp.'s plant in Live Oak County, Texas, to Corpus Christi.

Southern Pacific Pipe Lines, Inc.—Company has completed letting most of the contracts for its 846-mile products line from Los Angeles into Phoenix and El Paso into Phoenix. The contractors are:

... Schedule 1—158 miles of 8-in. between El Paso and Lordsburg, N. M., under construction by Morrison-Knudsen Co., Los Angeles, and River Construction Co., Fort Worth.

... Schedule 2—145 miles of 8-in. between Lordsburg and Tucson under construction by R. H. Fulton & Co., Lubbock, Tex.

... Schedule 3—122 miles of 8-in. and 35 miles of 12-in. from Tucson to Hassayampa, Ariz., contracted by Hood Construction Co., Lynwood, Calif.

... Schedule 4—128 miles of 12-in. from Hassayampa to Yuma, Ariz., let to Macco Corp. and Alex Roberson Co., Paramount, Calif.

... Schedules 5 and 6—197 miles of 12-in. between Yuma and Colton, Calif., let to Conyes Construction Co., San Pablo, Calif.

... Schedule 7—42 miles of 16-in. between Colton and La Habra, Calif. to be laid by J. E. Young Pipeline Contractor, Inc.

... Schedule 8—19 miles of 16-in. from La Habra to Watson let to Engineers, Ltd., Pipe Line Co.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost $4,200,000.

Sioux Oil Co.—Company will build a 55-mile products, 8-in. line from its Newcastle, Wyo., refinery to Rapid City, S. D.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport L.P.G. from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has received Federal Power Commission approval to abandon the "Little Inch" gas line and to convert it to products service. The campany will spend $13,000,000 converting the line back to products. When finished the line will have a capacity of 235,000 bbl. daily.

Non-Petroleum Pipelines

American Gilsonite Co.—Company has announced plans for a 100-mile pipeline from near Bonanza, Utah, to a proposed gilsonite refinery in western Colorado. The company, owned by Barber Oil Corp. and Standard Oil Co. of California, plans to make gasoline and coke by refining gilsonite. The gilsonite would be moved in a slurry.

Pipeline Patrol

Pittsburgh Consolidation Coal Co.—This firm has announced plans for the first pipeline to move coal. The line will be 108 miles of 10-in. from the company's Georgetown mines in eastern Ohio to Cleveland Electric Illuminating Co.'s Eastlake power plant northeast of Cleveland. Construction will start this fall. Ford, Bacon & Davis, Inc., will issue specifications, let contracts, and supervise the construction work. Williams Bros. has contract.

Natural-Gas Pipelines

• **Alabama - Tennessee Natural Gas Co.**—Company has proposal before FPC to lay 21 miles of 12-in. line west from its present line in Colbert County, Alabama.

American Louisiana Pipe Line Co.—Company has let bulk of its 1,121-mile line from North Tepetate, La., to Detroit. Only a 22-in. spur from Payne, Ind., to Bridgman, Mich., is still not awarded. H. C. Price Co., Bartlesville, Okla., has 783 miles of 30-in. pipe. One section will work south from the Hancock-Henry County line and the other will work north from Slaughters, Ky. Brown & Root has 221 miles of 30-in. from North Tepetate to the Louisiana-Arkansas border, and 39 miles of 16-in. line to be built under water. The firm has subcontracted the 221 miles to Associated Pipe Line Contractors and Western Contractors. It will lay the under-water line itself.

• **Carolina Natural Gas Corp.**—185 miles 8-12-in., proposed lateral lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

• **Central Kentucky Natural Gas Co.**—Company plans to build 21 miles of 24 and 20-in. pipe near Anderson Ferry, Ky. The project will cost $2,475,000.

• **Cities of Clarendon and Marvell, Ark.**—Cities have filed for FPC permission to interconnect their facilities with Texas Gas Corp.'s line south of Helena, Ark. The cities will build 53 miles of 4, 5, and 6-in. line to transport the gas.

Cities Service Gas Co.—R. H. Fulton & Co. is laying 93 miles of 26-in. between Blackwell, Okla., and Independence, Kans. for the company. Completion scheduled for December 1. The company also proposes to build a 145-mile gathering system in Woods County, Oklahoma, and Barber County, Kansas. The two jobs will cost $8,422,400.

• Company has FPC authority to remove 41 miles of line and to construct 39 miles as replacement in Newton, Lawrence, Lafayette, and Johnson counties, Missouri, and Johnson County, Kansas. The project will cost $1,685,000.

• **Coastal Transmission Co.**—Company plans to build 550 miles of 30-in. line from near McAllen in South Texas to near Baton Rouge (See Houston, Texas Gas & Oil Co.)

Colorado Interstate Gas Co.—Company has let first part of its 380-mile, 22-in. line from Rock Springs, Wyo., to Denver to Houston Contracting Co. The construction firm is working on 140 miles from near Laramie, Wyo., to Denver. About 65 miles completed by September 1. Associated Pipe Line Contractors will lay the other 240 miles next spring. The line will pick up gas from Pacific Northwest to Rock Springs, Wyo.

Colorado Interstate Gas Co.—Company is also spending $4,200,000 extending its gathering lines in the Panhandle of Texas, Oklahoma, and Kansas. Work will be done this summer.

• **El Paso Natural Gas Co.**—Company plans to increase its delivery to California. Most likely way is to loop its existing 500-mile, 30-in. line from the San Juan basin. The FPC has practically killed El Paso's chances of importing Canadian gas.

Firm also has FPC approval for 62 miles of 14-in. line from the Tex-Harvey plant in Midland County, Texas, to gas plant in Jameson County.

Gas Service Co.—Company is spending $216,000 building a 14-mile, 12-in. gas line from Kansas City to the new Mid-Continent International Airport there.

• **Houston Texas Gas & Oil Co.**—Company has applied to FPC for permission to lay a 960-mile gas line between Baton Rouge and Miami. The main line would consist of 507 miles of 30-in., 157 miles of 26-in., 61 miles of 20-in., 224 miles of 18-in., and 12 miles of 12-in. Company also plans 500 miles of sales laterals in Florida. Main line would join with Coastal Transmission's proposed line from McAllen to Baton Rouge.

• **Kentucky West Virginia Gas Co.**—Firm has FPC permission to construct 32 miles of line to connect with a line to be built by Clinchfield Coal Corp. near Osborne Gap, Ky. The line will extend to Kentucky West Virginia's existing system near Maytown, Ky. The Clinchfield job will cost $785,000. The Kentucky West Virginia work will cost $1,455,000.

• **Lone Star Gas Co.**—Company has two plans up before FPC to enlarge its system in Texas and Oklahoma. One is for an $18,000,000, 230-mile line from Cotton County, Oklahoma, to Fritch, Tex. The other plan is for a 205-mile line from Snyder, Tex., to a hookup with the Cotton-Fritch line. The company hopes to prevent Natural Gas Pipeline

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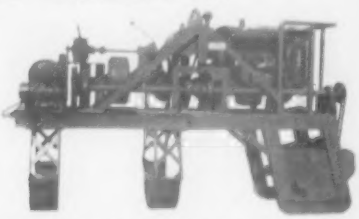

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Pipeline Patrol

Co. of America from building its line from Wise County, Texas, to Fritch (see below).

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

Michigan Gas Storage Co.—Bechtel Corp. has contract to build 36 miles of 16-in. line from Mount Pleasant Junction to Milwaukee, Mich. The line will cost $2,500,000. Bechtel has set October 15 as completion date.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

• **Montana-Dakota Utilities Co.**—Company has FPC authority to construct 44 miles of pipeline and 1,090 hp. in compressor capacity on its system in South Dakota and Wyoming. Estimated cost would be $1,414,218.

• **Natural Gas Storage Co. of Illinois**—Company now has FPC authority to build 31 miles of 36-in. line from its storage field in Kankakee and Iroquois counties, Illinois, to a connection with Texas Illinois Natural Gas Pipeline Co.'s line where it crosses the Illinois River.

• **Natural Gas Pipeline Co. of America**—Company now before FPC on plans to build 350 miles of 20 and 26-in. line from Wise County, East Texas, to its station 111 at Fritch, Tex.

Nevada Natural Gas Co.—Company plans looping program along its 114-mile line from Needles, Calif., to Las Vegas, Nev. Mileage and size are unknown but cost will be about $2,500,000.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, Va.

• **Niagara Mohawk Power Corp.**—Company plans no major transmission lines for 1955. However, it plans to add more than 300 miles of distribution mains.

• **Northern Natural Gas Co.**—Company plans to spend $32,000,000 to add 348 miles of main line and 307 miles of branch lines in Wisconsin, Minnesota, South Dakota, and Iowa. The application is before the FPC now. The main lines include 169 miles in the Duluth-Superior area and 164 miles in the Aberdeen area of South Dakota.

• **Pacific Gas & Electric Co.**—Company's long-range plans call for looping the Topock-Milpitas line with 135 miles of 34-in. The major part of the line will be laid in 1956, while 62 miles will be laid in 1957.

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Pipeline Patrol

Pacific Northwest Pipe Line Corp.—Firm has let the initial contracts of its 1,446 miles gas line from the San Juan basin to Bellingham, Wash. The first contracts total $11,236,000. Contractors and their sections are:

River Construction Co., two sections totalling 150 miles of 26-in. between Ignacio, Colo., and Moab, Utah.

R. H. Fulton Co., two sections totalling 160 miles of 26-in. between Moab and Jensen, Utah.

Associated Pipeline Contractors, Inc., one section of 77.6 miles of 26-in. between Jensen and Green River, Wyo.

A. J. Curtis Construction Co., one section of 82.8 miles of 22-in. from Green River to Sage, Wyo.

B & M Construction Corp., one section of 90 miles of 22-in. between Sage and Lava Hot Springs, Idaho.

Midwestern Constructors, Inc., one section of 95 miles of 22-in. from Hot Springs to Burley, Idaho.

H. B. Zachry Co., San Antonio, sections 9 and 10, 214 miles of 22-in. between Burley and Payette, Idaho.

Fulghum Construction Co., Harrisburg, Pa., sections 11 and 12, 198 miles of 22-in. between Payette and the Columbia River at the Oregon-Washington border.

A. J. Curtis Construction Co., Casper, section 26, 54 miles of 16-in. laterals and 31 miles of gathering-system lines from a point on the main line near Kemmerer, Wyo., to Big Piney field, Wyoming.

R. H. Fulton, Lubbock, section 27, 43 miles of lateral lines and 16 miles of gathering lines from Rangely, Colo., to Piceance Creek field, Colorado.

• **Panhandle Eastern Pipe Line Co.**—Company has plans to loop Peoria lateral before FPC now. The line would be 16-in. pipe running 58 miles from near Springfield to Peoria, Ill.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design, estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Southern Natural Gas Co.**—Company has temporary FPC authority to build 39 miles of loop lines and add 4,950 hp. to its compressor power near Atlanta, Ga. Job will cost about $2,000,000.

Tennessee Gas Transmission Corp.—Company is carrying out a large expansion program in New York, Pennsylvania, New Jersey, and Ohio. Oklahoma Pipe Line Constructors is working on 113 miles of 24-in. line from Covington to Laska-Waxen, Pa. Bechtel Corp. has lines for the company in New Jersey, and Pennsylvania. H. C. Price Co. has 130 miles of 24 and 26-in. in Ohio and Pennsylvania.

Company is now laying 370-mile, 30-in. line from Agua Dulce, Tex., to Kinder, La. Contractors are as follows:

...Morrison Constructors, Inc., 93 miles from Agua Dulce to Lavaca Bay.

...Williams Brothers Co., 73 miles from Lavaca Bay to Brazos River.

...Houston Contracting Co. and H. C. Price Co., 96 miles from Brazos River near Beaumont.

...Western Constructors, 81 miles from Beaumont to Kinder.

• T. G. T. has recently signed contract with Trans-Canada to take 200 M.M.c.f.d. at Emerson, Manitoba. In connection with this they will seek FPC authority to build 1,000-mile line from Emerson to Nashville.

The firm has also requested FPC permission to spend $56,000,000 in new pipeline and compressor facilities. The work will include 221 miles of 26 and 30-in. loops in Ohio and Kentucky and 376 miles of gathering lines in Louisiana and Texas. Some 12,450 hp. would be added in new and existing compressor stations in Texas, Louisiana, and Mississippi.

Texas Eastern Transmission Co.—Company has received FPC permission to begin converting its Little Inch line from natural gas to products service. Company has also proposed to Mobilization Director Arthur S. Flemming that the Government give it accelerated amortization on money to invest to put the Big Inch line on standby product service. The company's program is:

...To convert the Little Inch to products with a capacity of 235,000 bbl. daily and to install enough standby pumping equipment to hike the capacity to 375,000 bbl. daily if needed.

...To install standby pumping equipment along the Big Inch that would allow the line to be converted from gas to products in an emergency. The line would have a capacity of 425,000 bbl. daily.

Company has recently finished a 382-mile, 30-in. line from Beaumont, Tex., to Kosciusko, Miss. Firm also is considering importing Mexican gas and building a 400-mile line from the border into Beaumont.

Texas Gas Transmission Corp.—Company has big building program set to start soon and end approximately November 1.

From Covington, Ky., to Jefferstown, Ky., company will build 77 miles of 26-in. H. C. Price Co.

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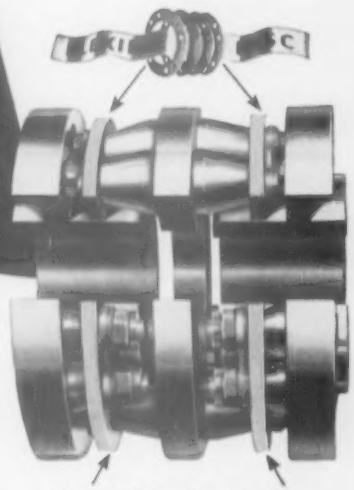

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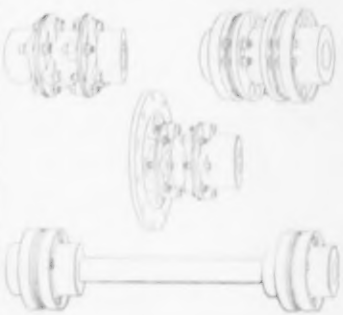

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Pipeline Patrol

Company will loop 14 miles of 20-in. at Haughton, La. Houston Contracting Co.

Will build 72 miles of 12-in. from Hardinsburg, Ky., to Bedford, Ind. Also will build 5 miles of 8-in. near Bedford. H. C. Price.

From Bastrop, La., to Clarkedale, Miss., the company will lay 50 miles of 30-in. H. C. Price.

From Eunice, La., to Morgan City, La., the firm will lay 105 miles of 20-in. H. C. Price.

• Company has also filed with the FPC for permission to add 198 miles of line and an additional 20,270 hp. in compressor capacity along the route of its system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Indiana. The project will cost $20,000,000.

• **Texas-Ohio Gas Co.**—Company proposes to build two systems, one from the Houston-Lake Charles area to Miami, Fla., and the other in the Carolinas and Georgia. Neither idea is before the FPC yet.

Transcontinental Gas Pipe Line Corp.—Company is completing the following contracts to lay 315 miles of 36-in. and 219 miles of 30-in.

Associated Pipe Line Contractors, Inc., will lay 63 miles of 36-in. in Louisiana and Mississppi and 71 miles of 30-in. in Virginia and Maryland.

Midwestern Constructors, Inc., will lay 14 miles of 30-in. and 54 miles of 36-in. in Alabama and Georgia.

Western Constructors will lay 77 miles of 36-in. in Georgia and South Carolina.

Panama-Williams Co. will lay 36 miles of 30-in. and 31 miles of 36-in. South Carolina and North Carolina.

Williams Brothers Co. will lay 72 miles of 36-in. in Georgia and South Carolina.

Panama-Williams Co. will lay 36 miles of 30-in. and 31 miles of 36-in. in South Carolina and North Carolina.

Williams Brothers Co. will lay 72 miles of 30-in. Virginia.

• Company has received FPC examiner approval to build 24 miles of line in South Bayou Mallet, Maxie, and Happytown fields in Louisiana to gather gas for movement in its interstate lines.

Transok Pipe Line Co.—Company has let contract to Pipe Line Service Co., Seminole, Okla., to lay a 140-mile, 24-in. line from Garvin County, Oklahoma, to Tulsa. The firm will also build a gathering system in the Bradley, West Lindsay, and Northwest Purdy fields.

• **Trunkline Gas Co.**—Firm has applied to FPC for authority to build eight new compressor stations and 24 miles of pipeline on its transmission system to enable it to sell additional gas to Panhandle Eastern Pipe Line Co. Total capacity of the new stations would be 56,000 hp. Total cost would be $18,700,000, including $1,000,000 for gathering facilities in the Gulf Coast area. Panhandle filed for 1,600 hp. additional compressor capacity to cost $3,714,000.

• **United Gas Pipe Line Co.**—Company has now received FPC authority to construct 63 miles of 16 and 20-in. natural-gas line in Mississippi, Alabama, and Florida. The company will also add 330 hp. to its compressor stations. Cost for the job will be about $8,300,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not yet let.

• **Wilcox Trend Gathering System, Inc.**—This subsidiary of Texas Eastern Transmission Corp. has received FPC permission to increase the capacity of its system to about 200,000 M.c.f. daily. The company will lay 16 miles of 16-in. and add 4,200 hp. in new additional compressors.

Foreign Crude-Oil Pipelines

• **Cremona Pipe Line Co.**—Firm has announced plans for a 60-mile crude-oil line from the Westward Ho-Sundre area to Calgary.

• **Esso, A. G.**—West Germany affilate of Standard Oil Co. (N. J.) plans line from North Sea port to Rhur-Rhine area. This will probably be 120-mile, 10-in. from Rotterdam to Cologne, the latter rumored as the site of a new 58,000-bbl. refinery to be built by the company.

Peace River Oil Pipe Line Co., Ltd.—Fulton-Banister, Ltd., has contract for 106-mile line from Sturgeon Lake field in Northwest Alberta to the Edson pumping station of

Yes, it takes **men, machines,** and **money** to produce oil and gas at a profit these days. And, more than that, it takes specialized financial advice every step of the way. That's where the **oil bank of Denver** can help you.

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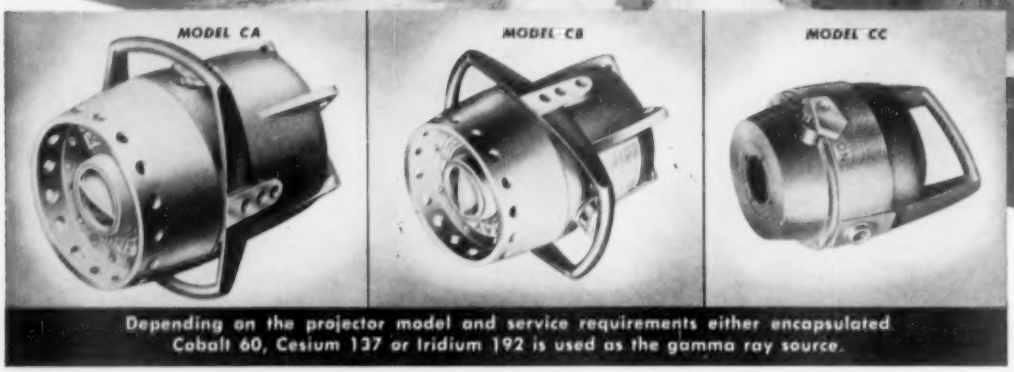
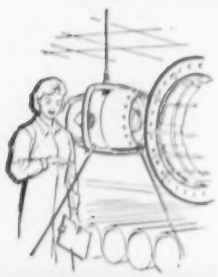
A safe versatile tool for Radiography with gamma rays . . .



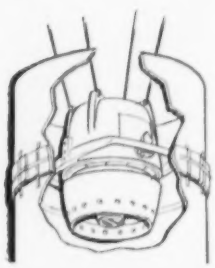
Depending on the projector model and service requirements either encapsulated Cobalt 60, Cesium 137 or Iridium 192 is used as the gamma ray source.

NON-DESTRUCTIVE INSPECTION and TESTING



SAFE

KEL-RAY projectors have extremely low radiation leakage. . . so low they can be shipped and stored without additional shielding. They are tamper, fire, and shock proof. Operated under prescribed procedures, leakage is below the AEC limit.

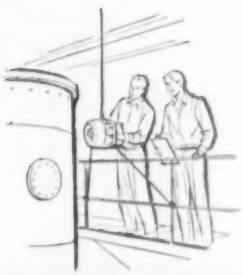


VERSATILE

A single set-up can produce either spot, doughnut, or hemisphere panoramic radiographs. Thick steel sections can be radiographed; sensitivity is so great even incandescent lamp filaments have been radiographed with a KEL-RAY projector.

CONVENIENT

Designed for field or shop use, the smallest model can be carried by hand—largest is transported and positioned speedily with standard equipment for materials handling and rigging.



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Pipeline Patrol

Trans Mountain Oil Pipe Line Co., Ltd. The project includes 41 miles of 16-in. and 65 miles of 12-in. Completion is set for December.

Pembina Pipe Line, Ltd.—Company has let approximately 400 miles of gathering lines in Pembina field to Hupp, Ltd. Work began last year and will be completed in November 1955.

• **Pembina Pipe Lines, Ltd.**—Company has announced proposal to build crude-oil line from Sundre-Westward Ho area of Alberta into Edmonton. Two other companies, Cremona Pipe Line Co. and Rangeland Pipeline Co. also have plans for moving the area's crude.

• **Rangeland Pipe Line Co.**—Subsidiary of Hudson's Bay Oil & Gas Co. has made proposal to build line out of Sundre-Westward Ho area to connect with a line of Texaco Exploration Co. and then go to connections with Trans Mountain and Interprovincial.

• **S & M Pipeline, Ltd., and Westspur Pipeline Co.**—Former company is a subsidiray of Canadian Devonian Petroleums, Ltd., and proposes to build a 100-mile crude line from southeastern Saskatchewan to the Interprovincial Pipeline Co. line of Cromer, Man. Westspur, a subsidiary of Imperial Oil, Ltd., proposes to build the same line. Another company, Trans Prairie Pipe Lines, Ltd., also is seeking a permit to build a similar line.

• **Standard - Vacuum Oil Co.** — Company has long-range plans for a 90-mile pipeline to give the new Lirik field in Central Sumatra an outlet. Completion is not scheduled before 1957 or 1958.

Yacimientos Petroliferos Fiscales Boliviano—Williams Brothers has contract to build a 230-mile, 6-in. products line from Cochabamba-Oruro-La Paz. The line will cost approximately $7,000,000. The Bolivian Government will eventually add a 10-in. products line from Oruro to Arica, Chile.

Foreign Products Pipelines

• **Empresa Nacional del Petroleo.**—80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of South Rhodesia and Portuguese East Africa.**—200 miles, considered. Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

• **Iraq Petroleum Co., Ltd.**—Company is making plans to lay a 75-mile, 24-in. products line from Homs, Syria, to Tripoli, Lebanon. The line would have a capacity of 180,000 bbl. daily.

• **National Fuel Oil Co.**—This company in Israel is a shareholder in a company which plans to build a products line between Haifa and Tel Aviv. The plans call for a 55-mile 6-in. line in which the Government would own 10 per cent.

• **National Iranian Oil Co.** — Company plans $32,300,000, 573-mile, 10-in. products pipeline from Ahwaz to Teheran, Iran. The line will have a capacity of 40,000 bbl. daily. Costain-John Brown, Ltd., London, will build the 337-mile southern part. Entrepose, Paris, will build the northern 236 miles.

• **North Atlantic Treaty Organization (NATO).**—This defense organization is building products lines to airforce bases in various parts of France. Approximately 2,000 miles of 4-in. line will be laid.

NATO—Associated Pipeline Contractors, Inc., Houston, is laying 450 miles of products line from Iskenderun, Turkey, to Batman, also in Turkey.

Overland Pipeline Corp.—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000 from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

• **Sinclair Oil Corp.**—Company is considering a 240-mile crude-oil line from its San Silvestre field in the state of Barinas, Venezuela, to Puerto Cabello on the Caribbean Sea coast. The line would cost $25,000,000.

U. S. Defense Department.—U. S. Defense Department is sponsoring a 485-mile, 8, 10, 12-in. products line from Cadiz to Zaragoza, Spain. The contract has been let to Merritt Chapman & Scott; Benson & Montin of Oklahoma City; and Agroman Construction Co., a Spanish firm. Brown-Raymond-Walsh is the prime contractor. Cost of the line will be approximately $5,000,000.

Winnipeg & Central Gas Co.—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D., plant and move it to Winnipeg. Size and route of the line has not been definitely established.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering contracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd., for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhuliar field to Rawalpindi in West Pakaistan.

• **Canadian Western Natural Gas Co.**—Firm will begin work this spring on a $1,000,000, 59-mile natural-gas project in southern Alberta. The company will also add a compressor station at Lethridge, Alta.

• **Empresa Nacional del Petroleo.** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

• **North Canadian Oils, Ltd.**—Company will lay 316 miles of 10-in. line from Wabumun to Hinton, Alta. The gas will be sold to a pulp mill at Hinton. Mid-Western Industrial Gas, Ltd., which will supply the gas along with North Canadian, will build a line from its gas fields in the Alexander, Majeau Lake, and Westlock districts to Wabumun.

South Alberta Pipe Line, Ltd.—Company has filed permit to construct a 150-mile, 8-in. natural-gas line from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta. The line will cost about $1,000,000.

Saskatchewan Power Corp.—Company has let contract to Majestic Contractors, Ltd., Edmonton, for a 226-mile natural-gas pipeline from Coleville to Prince Albert. The line from Coleville to Saskatoon will be 116 miles of 14-in. From Saskatoon to Prince Albert the line will include 40 miles of 12-in. and 70 miles of 10-in. Banister Construction, Ltd., has the distribution system for Prince Albert.

• **Sui Gas Transmission Co.** — Pakistan Constructors, a joint company of Morrison-Knudsen, Boise, Idaho, and William Press, Ltd., London, have contract to build a 188-mile, 16-in. line from Sui gas field to Moultan, Pakistan. Work will begin in mid-1956. The line will later be extended to Lahore, with branches at Kot Addu, Jhang, Magiana, and Montgomery.

• **Westcoast Transmission Co., Ltd.** — Company has signed agreement with Pacific Northwest Pipeline Corp. and has revived plans for its line from the Peace River area of Alberta and British Columbia to the United States border near Sumas, Wash. Plans call for work to begin sometime this year. Company has also announced plans for a second line to parallel the first and to swing east into the Okanagan Valley.

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Among the

Drilling Contractors

Wyoming Firm Reorganizes

Reorganization of Rimrock Drilling Co., Inc., of Newcastle, Wyo., under the name of Rimrock Petroleum Corp., has been announced by Harry A. Trueblood, Jr., president. The company has been active in Wyoming's Weston County exploration and development.

Dallas Drilling Co. has the drilling contract on Stanolind Oil & Gas Co.'s second test on its Prophet River Oil & Gas Co. farmout holdings in northeastern British Columbia, Canada. The test is designated as 1 Sheep Creek. Location is 7 miles south of Mile Post 363, on the Alaskan Highway. Drilling is projected to 8,500 ft. It is 60 miles from nearest production of any kind.

Jack Halbert, Tyler, Tex., has a new contract operation under way 9 miles east of Jacksonville, in Cherokee County, East Texas. It is a 5,500-ft. wildcat test for E. L. Pinkston, C. D. Davis, and George Williamson, joint operators. Location lists it as 1 Thompson. Spot is in the A. C. Walters Survey.

Carmack Drilling Co., Casper, Wyo., has a rig working for Continental Oil Co. in Raton basin, northeastern New Mexico. Location is in 2-21n-20e, 20 miles west of Raton, in Colfax County. The test is listed as 7 St. Louis. Planned depth is 5,750 ft.

Woolf & Magee, Tyler, Tex., will drill an 8,500-ft. wildcat test 2 miles northwest of Mount Carmel, in Sabine Parish, West Central Louisiana. It is a contract job for A. J. Hodges Industries, Inc., at 1-S Hodges. Spot location is in 20-6n-10w. It is 5 miles southeast of Many.

Penrod Drilling Co., Shreveport, is contractor for a Cotton Valley well to be drilled in Terryville field, Lincoln Parish, North Central Louisiana. The new 9,500-ft. operation is for Southwest Gas Producing Co., of Monroe, and Feazel Interests, of Shreveport. Location, at 1 Dowling, in 20-19n-4w, is 5,125 ft. southeast of the field's Cotton Valley discovery, and so far only producer, completed a year ago by the same operators.

S. D. Johnson, Denver, has a new wildcat operation under way south of Pinehurst, in Laramie County, southern Wyoming. It is being drilled for A. H. Rogers on the Pinehurst golf course, in 22-4n-60w.

Anchutz Drilling Co., Wichita, Kans., has a rig under contract to Dan Kamphausen in the Battleship area, 9 miles northwest of Walden, in northern Jackson County, North Central Colorado. Location is on government land in 9-10n-79w.

Maxwell Herring Drilling Co. is contractor on a wildcat test R. L. Peveto and S. A. Cochran are putting down in Jackson Smith Survey, 5½ miles south of Chandler, in Smith County, East Texas. Permit specifies a 5,500-ft.

Slim Hole Drilling Co., headquartering at Casper, Wyo., has been operating a rig in Harris County, Texas Gulf Coast. The day-tour crew, shown on a recently completed contract job, includes (left to right): L. E. Mariner, driller; Richard English and Charles Watson, floormen; and D. T. Dicess, derrickman.

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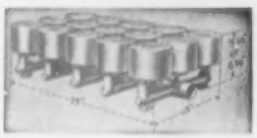

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test at 1 Friedlander. This contractor also has another new contract operation under way in Day's Chapel field, 5 miles east of Elkhart, in East Texas' Anderson County. The test, projected to 6,000 ft., is for L. A. Douglas and L. A. Grelling, at 1 Mays.

Trans Era Drilling Co., Wichita, Kans., is drilling at a wildcat location 15 miles northeast of Ashland, in Clark County, southwestern Kansas. It is a contract operation for Sterns Petroleum Co. Location is at 1 Strodlman, in 3-31-21. It is 7 miles north of Morrison field, nearest production. Contract calls for a 5,400-ft. test to the Mississippian.

Clinch Drilling Co., Jackson, Miss., is on a 5,500-ft. wildcat job 2 miles northeast of Denham, in Wayne County, eastern Mississippi. W. L. Pickens is the operator. Location, at 1 Board of Supervisors, in 16-8n-5w, is on the south end of the Turkey Creek prospect. Objective is the Eutaw formation.

Petersen Drilling Co., Shreveport, is drilling on a 6,000-ft. Wilcox test on the southern end of Vidal Island, 1¼ miles east of Ferriday, in Concordia Parish, eastern Louisiana. The test, 1 Caruthers, is a joint operation of Gauthier & Heard, W. L. Billups, and Petersen Petroleum Corp., producing affiliate of the contractor.

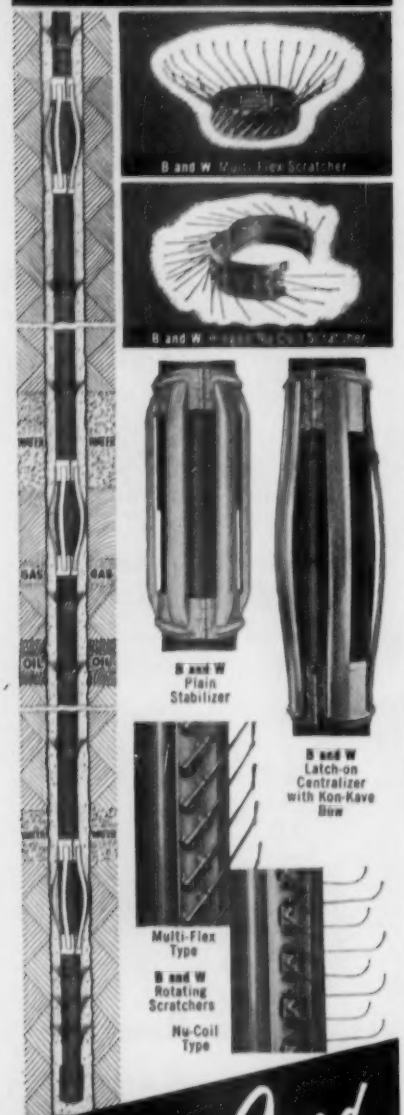
Combs, Bender & Graffagnino Drilling Co. is a newly formed firm headquartering at Beaumont, Tex. Its first operation is a 3,400-ft. Wilcox test 14 miles east of Zavalla, in Angelina County, eastern Texas. Location is at 1 Thornton, in the Jane Dearmond Survey.

Cactus Drilling Co., San Angelo Tex., has a new operation under way for Sunray Mid-Continent Oil Co. in the newly opened area 3 miles southwest of Vacuum field, in Lea County, New Mexico. Hole will be carried at 4,390 ft. Listing of the well is 1-H New Mexico State.

Johnson Drilling Co., Tyler, Tex., has a new 6,500-ft. wildcat operation under way 2½ miles northwest of Geneva, in Sabine County, eastern Texas. It is a contract job for Benedum & Compton at 1 Pickering, in the David Renfro Survey.

Arrow Drilling Co. is putting down Sunray Mid-Continent Oil Co.'s new Morrow test east of Grand Valley field in southwestern Beaver County, Oklahoma Panhandle. The operation, 1 Penner Unit, in 28-2n-20eCM, is scheduled to go to 7,200 ft.

B and W
SCRATCHERS AND CENTRALIZERS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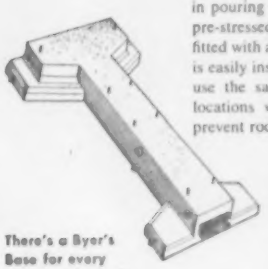

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Showcase

OF NEW EQUIPMENT AND LITERATURE

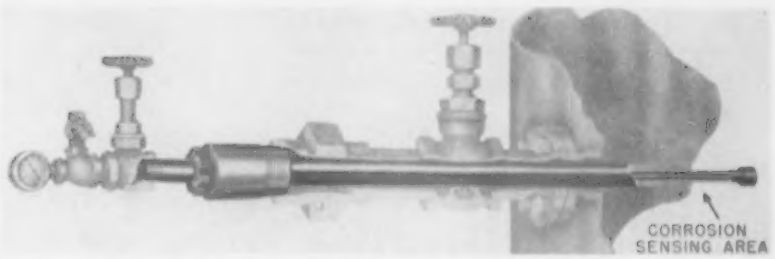
by Dan B. Miller

Lite-Flex Is Lighter, Stronger, and More Flexible

Lite-Flex fire hose, specification X-88, is lighter, less bulky, and stronger than conventional fire hose. The new fire hose is of particular interest to refineries, petrochemical plants, and pipeline stations. It will be of interest to geophysical companies for use as water lines.

The new hose has 60 per cent less bulk than regular rubber-lined cotton fire hose. Because of its greater flexibility and compactness of construction, Lite-Flex will coil into a much smaller diameter. One hundred feet of 1½-in.-diameter hose makes a coil less than 18 in. in diameter. It is also 50 per cent lighter than conventional hose and easier to handle. Actual weight per 100-ft. length is: 1 in.—14 lb., 1½ in.—20 lb., 2½ in.—41 lb.

Lite-Flex is 67 per cent stronger. It has a rated burst pressure of 1,000 psi. in the 1-in. size and 700 psi. in the 1½-in. size. This greater strength pays off in the hose's ability to withstand continuous flexing and rough, abrasive wear. The outer surface of the hose is thoroughly impregnated with all-weather water-repellent Neoprene and at the same time is processed with a mildew deterrent. **For more information write or call: Goodall Rubber Co. of Texas, 3550 West 12th Street, Houston, Tex.**



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The Texsteam hydrogen probe is a device that gives a warning indication on a pressure gage when dangerous hydrogen blisters are corroding the walls of metal tanks in which chemical reaction is in process under pressure.

The hydrogen probe is made of seamless carbon-steel tubing. One end is closed and machined to make a thinner-walled section called the corrosive-sensing area. This end is inserted into the chemical processing tank. The other end, extending outside the tank, is held in position with fittings and pressure-tight packing.

If, inside the tank, there is the right combination of hydrogen ions, sulfides, temperature and/or acidic compounds that can penetrate steel and form hydrogen blisters, these blisters will be formed inside the thinner-walled section of the hydrogen probe before excessive damage is done to the wall of the tank. The hydrogen from the blister will show its presence on the pressure gage on the probe outside the tank. The operator can then take protective action. **For more information write or call: Texsteam Corp., 320 Hughes Street, Houston 11, Tex.**

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The OIL AND GAS JOURNAL Showcase
.....OF NEW EQUIPMENT

Core Sniffer Gives Lab Accuracy in Field Use

The Wemco core sniffer, designed to detect gas accurately and quickly, is built to be used in the field. It combines the sensitivity of a laboratory instrument with the ruggedness, light weight, and ease of operation needed at the well. To operate, insert probes into cap of jar containing specimen and aspirate the bulb to force trapped gas vapors into the detecting filament. During this operation there is no chance for gas to escape or for outside air to contaminate the specimen. Following the test, cover the holes in the cap with Scotch tape. The specimen can then be sent to the laboratory without any of the trapped gases being lost.

Instant interpretation of the indicator discloses the absence or presence of minute units of gas in each core tested. The simplified design reduces weight without sacrificing accuracy of measurement. Using only the instrument itself for self-checking, the operator can assure himself of its correct operation in a matter of seconds. **For more information write or call: Well Logging Equipment Manufacturing Co., 1920 Hussion Street, Houston, Tex.**

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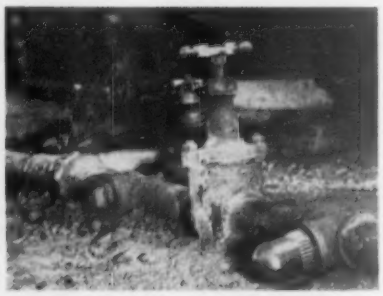

Oil Miser Drain Control Eliminates Wasted Oil

The Oil Miser drain control is a new, positive way of eliminating wasted oil and wasted time in bleeding storage tanks. It allows the operator to see inside the bleeder line at valve. The transparent bulb screws into a standard 2-in. tee and shows instantly when water and sediment are out of the tank. The baffle, placed inside the bulb for positive operation, is easy to remove and install for occasional cleaning.

Recommended for use at a maximum temperature of 130° F. and maximum pressure of 100 psi. at 100° F. and 75 psi. at 130° F., the Oil Miser can also be used on flow lines, christmas trees, or whenever it is desirable to watch fluid flow through the pipe. **For more information write or call: Alvis L. Barrier, Southland Plastic Products Co., Phone 1304, P. O. Box 464, Mineral Wells, Texas.**

Controlled Volume Pump Uses 3 to 15 Psi. Air

A new controlled volume pump with instrument-air stroke-length adjustment has been designed for use in pneumatic-process-control systems. Designed to solve specific low-capacity flow-control problems, the new pump uses an air servo system with feed-back loop to give capacity adjustment with an accuracy within 1 per cent.

Stroke length is infinitely adjustable from 0 to 100 per cent of full length by means of a reversible rotary air motor. This motor and other components of the system are housed in a 22-in.-high cabinet mounted on the pump base. Four gages show key air pressures at all times. Actual stroke length is indicated by a dial mounted on the pump.

Sensitivity is such that a 1/70 psi. change in instrument control air pressure causes resetting of pump-stroke length. **For more information write or call: Milton Roy Co., Station N, 1300 East Mermaid Lane, Philadelphia 18, Pa.**

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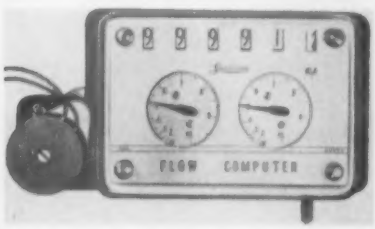

Instrument Computes Wide Variation of Flow Rates

The flow computer is a newly designed instrument for the orifice metering of gas by the use of a continuous, pressure-compensated integration principle. This enables the instrument to handle widely varying flow rates with high accuracy. This flow computer will reduce and, in some instances, replace the need for charts. It is a mechanical device, clock-motor driven by electrical or pneumatic means. It may be installed in the instrument case of an

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existing orifice-meter installation, or obtained complete with pressure elements. The same type of pressure elements that actuate the pen arms in conventional installations will serve as inputs to the computer.

The flow computer continuously computes the extension factor in the flow equation; that is, the square root of the product of static and differential pressure. It then totalizes the result on a mechanical counter, and provides a switch closure for an electric-pulse output.

The mechanical circuit consists of a clock motor that drives a counter through a gear train and two double-disk integrators connected in series. The magnitude of the speed change depends on the amount of displacement of the balls from the center of the disk.

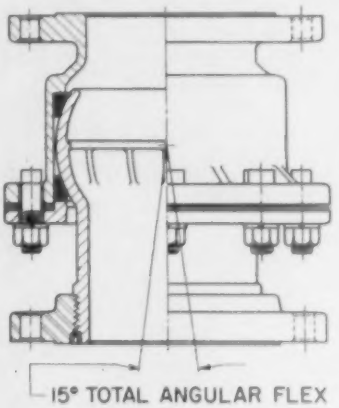
The integrators are identical in design. One disk transmits motion to the other disk through two steel balls held in a ball carriage. Through connecting linkage, the ball carriage moves from center a distance dependent on the displacement of the pressure elements from zero. Connected to the input linkage is a dial movement which indicates the input value on a dial calibrated like a square-root chart. The square root of the input value is generated not by a cam but by the combined action of the linkage and of the double disks. **For more information write or call: Ken Slee, sales manager, Librascope, Inc., 808 Western Avenue, Glendale, Calif.**

●

Large Ball Joints Are Lighter and Stronger

Ball joints of a new design in 8, 10 and 12-in. sizes may be ordered in flanged-end and welding-end patterns, in steel or Bar-Ductile metal. Flanged-end joints are available with 150 or 300-psi. flanges. Joints with welding ends are suitable for 600-psi. steam and operating temperatures up to 1000° F. All are lighter, stronger, and cost less than the previous design.

Both flanged-end and welding-end patterns may be equipped with Barco's general-purpose special composition No. 11 gasket for gasoline, oil, water, non-corrosive chemicals, and steam up to 300 psi. This gasket is particularly recommended for tank settling or expansion movement. IICT gaskets for corrosive service, and IIMA gaskets for temperatures above 425° F. and higher hydraulic, air, or gas pressures are also available.



Outstanding advantages of these new ball joints are their resistance to fire (unaffected by 45 minutes' exposure to fire at 950° to 1200° F), and the 15° angular flexing which provides greater safety in tank settling, alignment piping, earthquake tremors, and thermal expansion. **For more information write or call: Barco Manufacturing Co., Dept. J-22, Hough St., Barrington, Ill.**

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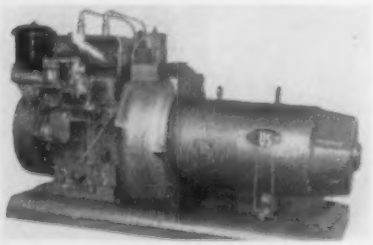

Micro Power Unit Cuts In When Line Power Drops

Of particular interest to pipeline men concerned with telemetering, microwave, and other installations dependent on electric power, is the Micro power unit, an emergency standby engine generator.

The unit's design enables it to furnish full-load power when line voltage drops a predetermined amount. The engine, magnetic clutch, flywheel, motor, and generator are all mounted with shafts in line on a common base. The clutch, flywheel, motor, and generator

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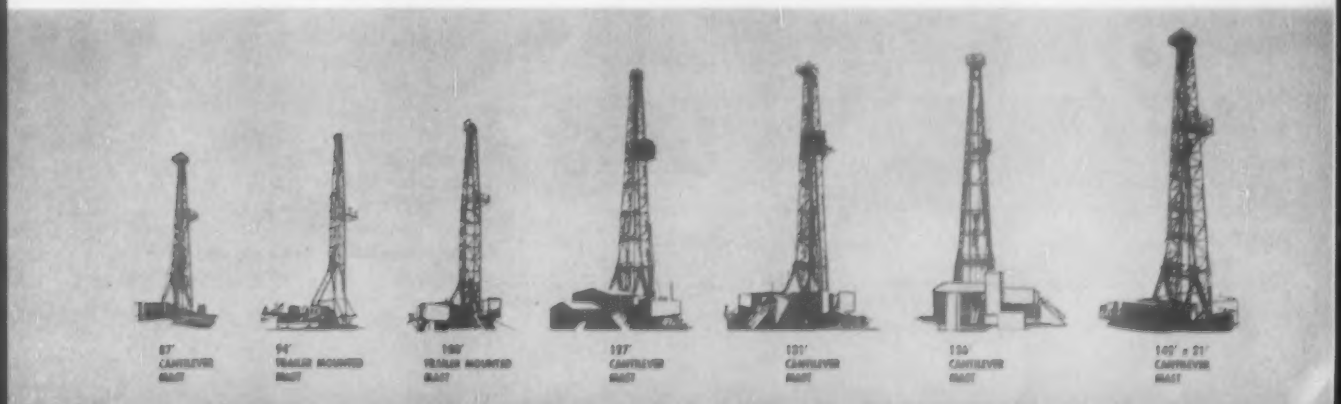

are on a common shaft. The clutch, when engaged, connects the heavy flywheel to the engine shaft, cranking the engine (only at time of power failure) at 1,800 r.p.m. The Micro power unit is connected to line voltage at all times, causing the motor to turn the generator and flywheel at all times.

When the line voltage drops a predetermined amount, the magnetic clutch engages the flywheel to the engine and cranks it at 1,800 r.p.m. When the engine drives the motor and generator, the generator is no longer connected in the line, and the generator supplies power to the load. These units are available in 1,500, 3,500, and 5,000-watt sizes. **For more information write or call: United States Motor Corp., Oshkosh, Wis.**

●

Tractor Made for Oil Field Use

A new four-by-four transport tractor is shorter and lighter than previous FWD's and is designed to give maximum payload in any oil-field semi-trailer operation.

The new Model T-47 weighs only 10,075 lb., including 100 gal. of fuel but without fifth wheel. The weight is 3,950 lb. on rear axle, 6,125 on front. The tractor is only 31 in. from front bumper to front axle and 98 in. from bumper to back of cab.

With a trailer weighing 8,000 lb., it is possible for the new FWD four-wheel-drive tractor to haul 40,244 lb. of payload and still stay within a 58,420-lb. limit.

In addition, the new tractor is equipped with an RD-501, 212-hp. engine, FWD's power-proportioning center differential, and an eight-speed R-46 transmission.

With this combination, the T-47 tractor has been engineered to maintain top legal highway speeds easily and safely, and still provide the advantage of four-wheel-drive in off-highway situations.

The new tractor, with standard 142-in. wheelbase, can carry up to 20 per cent of the kingpin load on the front driving axle. The new power plant is a six-cylinder valve-in-head engine which develops 444 lb.-ft. of torque at 1,600 r.p.m. **For more information write or call: Four Wheel Drive Auto Co., Clintonville, Wis.**

●

Air-Cooled Engine Gives Smooth Performance

A new two-cylinder, air-cooled gasoline engine, Model CCK, has been designed to meet the demand for greater capacity in small-sized engines. Its opposed-cylinder design lends itself to applications where smooth-running performance is essential and where installation space is at a premium.

Fundamentally, the CCK engine is a two-cylinder, horizontally-opposed, four-cycle, air-cooled engine rated at 12.9 hp. (corrected b.hp. with accessories) at 2,700 r.p.m. It is gasoline-driven, has a 3¼-in. bore, 3-in. stroke, 50.0-cu.-in. piston displacement, and the compression ratio is 5.5 to 1. It weighs 148 lb., dry, with accessories.

Model CCK is 19½ in. wide, 17⅞ in. high, and 14¾ in. long. It is manually started by means of a pull rope, although a Readi-pull recoil starter is optional. Standard accessories include the pull rope, muffler, and instruction manual. Listed as optional accessories are: Readi-pull starter; gas-gasoline carburetor, and a mounted fuel tank. **For more information write or call: D. W. Onan & Sons, Inc., Minneapolis, Minn.**

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OIL AND GAS JOURNAL

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Mud Supplies and Services. This 1955-56 catalog is a helpful text on every mud problem encountered in the oil fields. Discussions on each product include pertinent information on applications, storage precautions, and control. A formation diagram correlates the drilling operation with the mud conditioner prescribed. **For more information write or call: Baroid Division, National Lead Co., P. O. Box 1675, Houston, Tex.**

■

Pressure-Rated Kralastic and Tenite Pipe. This new literature gives specific technical information on oil-field applications of both types of plastic pipe, and outlines chemical resistance and physical properties of each pipe along with tables and graphs of tensile strength vs. temperature and limitations. **For more information write or call: Southwestern Plastic Pipe Co., P. O. Box 117, Mineral Wells, Tex.**

■

Airetool Tube Cleaners, Tube Expanders, and Refinery Specialties. Bulletin 56, a 20-page catalog of tube installation and maintenance equipment, carries an illustration of every item listed, complete ordering information, and the names, addresses, and phone numbers of its representatives. **For more information write or call: Airetool Manufacturing Co., phone 3-4988, 304 South Center Street, Springfield, Ohio.**

■

Tioga illustrates the stages of construction and many of the obstacles met in design and construction of Signal Oil & Gas Co.'s composite plant at Tioga, N. D. Segments of the plant that are illustrated are: gas compression, power, cooling by boiling, amine units, sulfur recovery, extraction, treating, and storage. **For more information write or call: J. F. Pritchard & Co., 4625 Roanoke Parkway, Kansas City 12, Mo.**

■

Texrope Drive Selection Booklet, a 74-page booklet, 20P40, carries handy multicolor tables for quick and easy selection of constant-speed Texrope V-belt drives. In addition, the handbook features valuable information on design features, basic drive principles, and technical data on sheaves. It also offers helpful hints for economical, safe, and dependable operation of V-belt drives. **For more information write or call: Allis-Chalmers Manufacturing Co., 1059 South 70th Street, Milwaukee, Wis.**

■

Ninety Industrial Rubber Products. Specifications and descriptions of 68 different types of rubber hose for every industrial use are presented in the new eight-page catalog digest. The brochure contains data on nine types of conveyor belts, seven types of flat power-transmission belting, multiple and fractional horsepower V-belts, chute lining, rubber-sheet packing, and industrial friction materials. Twenty-three cutaway photographs show hose, coupling, and belt construction. **For more information write or call: Industrial Rubber Division, Thermoid Co., Trenton, N. J.**

■

New Folder ND4 (8)—Adjusting Type Electro - Pneumatic Control contains complete information about a new Series 60 current-adjusting-type control unit and its associated converter for electropneumatic control. This new eight-page publication describes how this control system, which includes a Speedomax G or H indicator/recorder, combines the advantages of pneumatic-valve operation with the flexibility and fast response of an electrical control system. **For more information write or call: Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia 44, Pa.**

■

Bowen Catalog. A comprehensive, completely illustrated, 68-page catalog covers major models of overshots, spears, cutters, casing patches, scrapers, a patented hydraulic rotary jar, fishing and drilling bumper subs, safety joints, line wipers, and wire-line equipment. The sections of this catalog cover construction, assembly, operation, and maintenance of each tool and carry complete illustrations of working parts and prices. **For more information write or call: Bowen Co. of Texas, Inc., P. O. Box 4587, Houston 13, Tex.**

■

Specialized Tools and Services. This 1956 40-page catalog contains a complete description of the entire line of spcialized tools and services available to the oil industry through the McCullough Tool Co. It gives a comprehensive explanation of the sizes, ap-

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plications and operation of all tools and services. Included are the most recent improvements in such tools as the M-3 bullet perforators, glass jet perforators, one-trip-backoff service, jet casing cutters, bottom-hole jet cutters, and Type-B bridge plugs. The new chemical tubing cutter and its applications is also included for the first time. **For more information write or call: McCullough Tool Co., 5820 South Alameda Street, Los Angeles 58, Calif.**

●

Netherlands Oil Equipment Manufacturers Catalog. The 1955 edition of this extensive catalog includes complete details and line drawings of equipment manufactured for every branch of the petroleum industry. The 38 manufacturers represented in the catalog are located in the Netherlands. **For more information write or call: Y. A. Kuipers, Netherlands Oil Equipment Manufacturers, 13, Nassaulan, The Hague, The Netherlands.**

●

DBPC and Impruvol 33. A new technical bulletin, C-5-179, describes in detail the results of experiments and tests with antioxidant additive for gasolines. The new illustrated bulletin presents factual comprehensive data resulting from years of research on antioxidants to inhibit gum-formation in automotive and aircraft engines. Much of this technical data has not heretofore been published. Designed for the refiner seeking high-quality improvement of his gasoline plus lower treating costs, a new inhibiting practice involving the use of DBPC is outlined in detail in the 24-page bulletin. **For more information write or call: Chemical Division, Koppers Co., Inc., 1301 Koppers Building, Pittsburgh 19, Pa.**

●

Petroleum—The Black Gold That Gave Us Freedom of Movement. The petroleum industry and its contributions to the development of modern America are being honored in a double anniversary issue of Valve World. The issue celebrates the fiftieth anniversary of the magazine and the hundredth anniversary of Crane Co. and traces highlights in the 100-year progress of many of the American industries with which Crane Co. has grown. **For more information write or call: Crane Co., 836 South Michigan Avenue, Chicago 5, Ill.**

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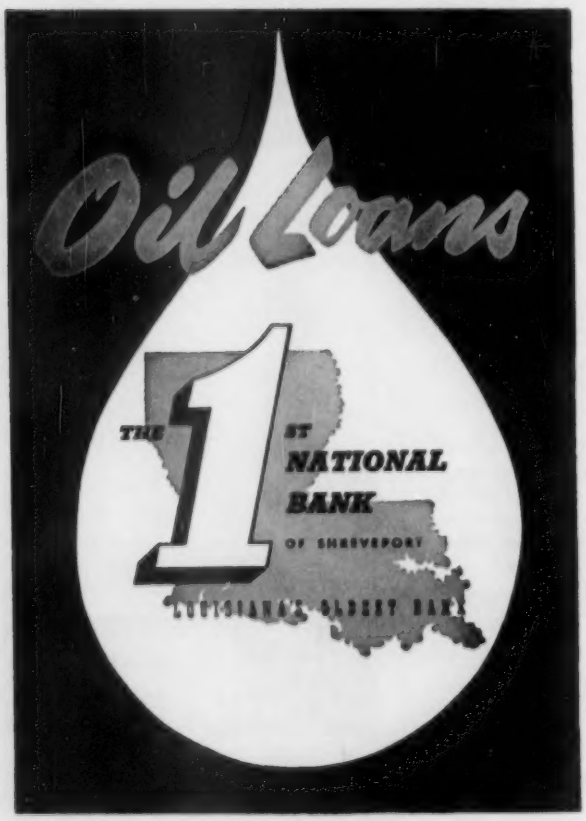
Thermon, The Revolutionary New Heat-Transfer Medium, a six-page, two-color foldout discusses the transfer and



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In a dually completed well, the additional cost of Oilmaster dual pumping equipment is surprisingly low. Actually, it amounts to only a few per cent of the cost of drilling a second well. If you are in an area where productive horizons overlie one another and are interested in faster payouts or higher allowables, contact your nearest Oilmaster Representative, or write Fluid Packed Pump Company for complete information on

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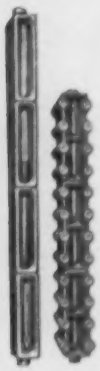

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storage of materials that have high freezing points, and become highly viscous or solidify at normal temperatures. The bulletin includes heat-transfer data pertinent to Thermon and lists advantages of Thermonizing. This is a method of covering either conventional steam-traced or thermal-electric systems with Thermon, a nonmetallic plastic compound with highly efficient heat-transfer properties. **For more information write or call: Thermon Manufacturing Co., 1017 Rosine Street, P. O. Box 1961, Houston, Tex.**

•

Here's How Pipeliners Helped to Set Up a New Idea in Aerial Pipeline Patrol, a 14-page brochure, illustrates the equipment used, describes the closed-circuit and emergency method of patroling, and gives a brief history of the company's key personnel. The back page of the brochure is a pipeline map indicating those lines or right-of-ways under regular patrol by Gleason Roman's planes. **For more information write or call: Gleason Roman's Pipe Line Patrol Co., Phone TEmple 8-1340, P. O. Box 8447, Tulsa, Okla.**

•

Molybdenum Catalysts for Industrial Processes, a 24-page booklet, reports a 600 per cent increase in the use of molybdenum in catalysts over the past 2 years. Currently 1,200,000 lb. of molybdenum are going into catalysts as contrasted with 200,000 lb. 2 years ago. Characteristics of molybdenum catalysts responsible for this rapid growth are selectivity, high activity, nonpoisoning, and comparatively low cost. The latter factor is especially important in keeping down the costs of catalyst losses in fluid-bed processes, and actually makes the fluid-bed method feasible. Reactions which research and pilot-plant work indicate may be advantageously catalyzed by molybdenum compounds as well as commercial processes now using molybdenum catalysts are reviewed in the booklet. The commercial reactions include oxidation, hydrogenation, dehydrogenation, isomerization, chlorination, and condensation. **For more information write or call: Climax Molybdenum Co., Department L, 500 Fifth Avenue, New York 36, N. Y.**

•

Powell Lubricated Plug Valves, 36-page Catalog PV-4, shows in detail the complete line of available iron and steel lubricated plug valves. Many illustrations of the single, screwed, and bolted gland-type valves are shown, including photographs, sectional and detailed drawings. Also included is physical data on dimensions and ratings. **For more information write or call: The William Powell Co., Cincinnati 22, Ohio.**

•

Small Forged Steel Valves. A new bulleton 551, covering small forged-steel valves, illustrates and gives details on Edward forged-steel stop, stop-check, and needle valves for a variety of applications, including steam-power stations, boiler piping, petroleum installations, chemical and industrial plants, and marine service. **For more information write or call: Edward Valves, Inc., 1201 West 145th Street, East Chicago, Ind.**

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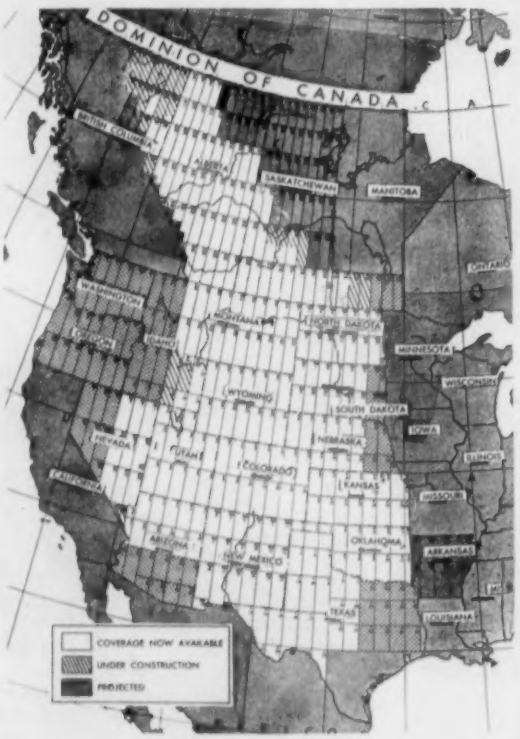

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REED DRILL COLLARS keep you out of expensive trouble such as: drill stem whip from misalignment . . . short life from fatigue cracks . . . fishing jobs from these and many other failures resulting from imperfections due to poor design and lack of precision manufacture.

WHEN YOU BUY REED DRILL COLLARS you get the advantage of *Reed precision manufacturing* to give you tougher, longer-lasting, fatigue-resistant drill collars . . . *Reed pre-lubrication* that practically eliminates thread galling . . . *Reed Hi-Flex treatment* that prevents fatigue cracks from starting . . . *Reed's 120 continuous inspections* that assure Reed Drill Collars being the safest money can buy.

SEND FOR BULLETIN NO. DC555 . . . This bulletin will give you the reasons why Reed Drill Collars enable you to avoid trouble and save money. It contains specifications, dimensions, weights, torque tables and other use data. The book also gives pointers on care and maintenance of drill collars.

REED

ROLLER BIT COMPANY

HOUSTON 1, TEXAS

Gulf Coast, Mid-Continent, Rocky Mountain and Canadian Distributor for Martin-Decker Products

EQUIPMENT MEN . . . in the News

Oilwell Announces Changes In Gulf Coast Area

Promotion of Julius L. Hickman to district representative at Brookhaven, Miss., and the appointment of two new store managers in southern Louisiana have been announced by M. F. Jones, Gulf Coast area manager for U. S. Steel's Oil Well Supply Division.

Named store manager at Houma was Louis A. Wassenich. He moves to his new post from Beaumont, Tex., where he joined Oilwell in 1950 as a store man. He has served as field representative there since 1953.

Hilliard L. Roberts has been appointed manager of Oilwell's New Iberia store. Employed by the division as a store man at Houston in 1952, Roberts transferred to Lake Charles, La., the following year. He was elevated to field representative there in 1954.

Hickman was manager of Oilwell's Brookhaven store at the time of his new appointment. He joined Oilwell in 1946 as a field representative at the Natchez, Miss., store. He transferred to Brookhaven the following year and served as field representative there before becoming store manager.

Haltenberger to Tour World for Cardwell

HALTENBERGER

Traveling to distant countries all over the world to visit government representatives and other Cardwell customers will be the major duty of Jules Haltenberger, recent addition to Cardwell Manufacturing Co.'s export division, according to a recent announcement by H. W. Cardwell, president of Cardwell Manufacturing Co., Wichita, Kans.

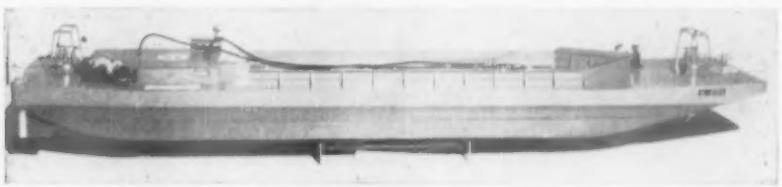
Haltenberger has been in the petroleum industry since 1936. At that time he returned to Hungary as a dealer for Cardwell, Caterpillar Tractor Co., and several other manufacturers of heavy equipment.

During the following years he organized the sales and service of these machines in his country, and supplied the Hungarian oil field, operated by Standard Oil Co. (N. J.), with all kinds of machinery.

When war broke out in Europe, machines could not be received from the United States, so Haltenberger joined Ford Motor Co. in Budapest as chief engineer and technical director.

Haltenberger took the first opportunity to return to this country and to the oil industry in February 1955 when he entered as a permanent resident. In March he joined the Cardwell organization.

Baroid Adapts Navy Method for Delivering Mud



The vessel is officially known as the "George L. Ratcliffe," and will probably be launched in early November. The hull was designed by O. P. Erickson of Tampa, Fla., and the model in the photo was made from his drawings.

Because delivery of drilling mud to offshore operations presents a specialized problem in transportation, Baroid Division of National Lead Co. has adapted the U. S. Navy method of fueling at sea to the delivery of drilling mud. This method insures maximum safety to the drilling platforms, tender ships, and operating personnel and makes possible delivery of drilling mud in all but the worst kind of weather.

The delivery vessel is basically an ocean-going vessel with a pay load capacity of 1,500 tons of drilling mud. In addition to mud, the vessel can carry 600 tons of fresh water and 100 tons of diesel fuel for emergency delivery to offshore drilling rigs. The vessel design meets ABS specifications and has been assigned a load line.

This, the first drilling-mud delivery vessel specifically designed for offshore work, will be towed to the vicinity of the operating rig. The tug will then release the delivery vessel whose two propulsion units, one forward and one aft, will take over the job of maneuvering it into a safe anchorage.

The dry bulk-mud material will normally be carried in the hold. The main deck, will, however, be provided with a bulkwarked area sufficient to carry 1,000 tons of bagged material or 1,200 tons of bulk containers.

Rockwell Blueprints West Coast Expansion

Plans for a new 100,000-sq.-ft. warehouse, assembly, and repair plant at Porterville, Calif., are examined by executives of Rockwell Manufacturing Co., Pittsburgh. H. Boezinger, standing, western regional manager, and L. A. Dixon, Jr., vice president, Meter and Valve Division, estimate the new one-million-dollar plant will be completed by early 1956.

On the 32-acre site, Rockwell will assemble, repair, and warehouse its meter and valve products for West Coast distribution.

Mountain Iron Opens Sales Office In Dallas

Announcement was made recently that Mountain Iron & Supply Co. has expanded its oil-field service and supply facilities by establishing a sales office in Dallas. At the same time it was revealed that Frank Northway of Dallas has been appointed sales manager of the new Texas district.

The expansion move is the second step forward that the Misco organization has made in recent months to enlarge its service area. Last February a Mountain Iron store was opened in Kimball, Neb., to expedite service in the Rocky Mountain region.

Texas is now the sixth state that the company covers with oil-field sup-

plies and service. Other states are Kansas, Oklahoma, Colorado, Nebraska, and West Virginia.

Northway has been associated with the oil industry since the close of World War II. Six of these years he spent in the supply business and the remainder of the time he was with Humphrey Oil Corp.

Schlumberger Elects Suman Vice President, Director

JOHN R. SUMAN

John R. Suman, former vice president and director of Standard Oil Co. (N. J.), has been elected a director of Schlumberger Well Surveying Corp., of Houston, Pierre Schlumberger, president, has announced. Suman retired from Standard Oil Co. in March 1955. He opened an office in Houston as a consultant. He was retained by Chemical Corn Exchange Bank and Blyth & Co., Inc., of New York to act in a consulting capacity for them.

Suman has been active in the oil business since 1912 when he began his career as assistant geologist for the Rio Bravo Oil Co. in Houston. He was chief engineer for Rio Bravo from 1913 until 1917. From 1917 to 1919 he was technical superintendent for Texas and Louisiana for Roxana Petroleum Co. In 1919 he returned to Rio Bravo as assistant to the vice president and general manager. He was also assistant manager of the East Coast Oil Co. of Mexico, a subsidiary of Southern Pacific, in 1922 and manager in 1923. From 1923 to 1926 he served as general manager of the Texas operations of the Associated Oil Co. of California.

Suman was a director of the Humble Oil & Refining Co., Houston, from 1927 to 1933, at which time he was made vice president in charge of production. In 1945 Suman was elected vice president and director of Standard Oil Co. (N. J.) and became a regular member of the executive committee in 1946.

Lane-Wells Names Redford Division Sales Engineer

W. Redford has been appointed division sales engineer at the Midland, Tex., sales office, announces C. E. Shilcutt, district superintendent.

Redford joined Lane-Wells in the North Central Texas area. Prior to his appointment as division sales engineer, Redford was in operations and sales in the North Central Texas and Ark-La-Tex areas.

National Supply Opens Store at Graham, Tex.

The National Supply Co. has opened a new oil-well-equipment and supply store at Graham, Young County, Texas.

The store was opened to give faster service in Young, Jack, and Throckmorton counties, which up to now have been covered by National Supply stores in Wichita Falls, Breckenridge, and Electra, Tex.

Equipped with a downwell-pump repair shop, the new Graham store offers pump supply and repair service to producers.

C. G. Rich has been appointed store manager. The Graham store is under the supervision of J. G. Lovett, Jr., district manager, Wichita Falls.

Clark Makes Management Changes In Houston Area

E. G. HOTZE

The retirement of F. H. Hayes, vice president and district manager of the Houston territory, and the appointment of E. G. Hotze to succeed him as district manager has been announced by Clark Brothers Co., Olean, N. Y. One of the Dresser Industries, Clark Brothers Co. is a manufacturer of heavy-duty engines, compressors, and gas turbines.

Hotze's career in the oil and gas industry began in 1935 when he became associated with the Cities Service Oil Co. in Oklahoma City. In 1942 he joined Clark Brothers as a sales engineer and in 1952 was named assistant manager of the Houston district territory.

Thames Rejoins Rotary As General Sales Manager

A. C. THAMES

Officials of Rotary Engineering Co. have announced the reemployment of A. C. (Jack) Thames as general sales manager and assistant to the president. The announcement was made by Olin R. Prather, president, who said Thames would be in charge of all sales work for the firm in the United States.

Thames rejoined Rotary after a year's stint with Western Co. in the sales division. Prior to this position Thames served Rotary as a well-logging engineer.

Warner Lewis Promotes Fitzgerald to Be President

FITZGERALD

In a special meeting of the board of directors of Warner Lewis Co., J. N. Fitzgerald was promoted to president of the company. At this same meeting, the board accepted the resignation of Warner Lewis as president and elected him chairman of the board. Steven B. Wilson was elected honorary chairman.

Fitzgerald joined the Warner Lewis Co. in 1948 as its Washington representative and remained in that capacity as a vice president of the company until January 1954. At that time, the Warner Lewis Co. was acquired by the Fram Corp. as a wholly owned subsidiary. Fitzgerald was then moved to Tulsa as executive vice president for this subsidiary.

In February 1955, Fitzgerald was transferred to the Washington, D. C., office of the Fram Corp. as vice president in charge of sales for Warner Lewis Co. He left that post upon his promotion to the company presidency.

Magcobar Announces Sales, Service Personnel Changes

Willard M. Johnson, president of Magnet Cove Barium Corp., has announced the following personnel changes in the Houston drilling-mud firm's sales and service department.

Franklin H. Loe has been named sales manager of the drilling-mud department, and George H. Moore is the new sales manager of the industrial-products department. Frank H. Carson, formerly director of personnel for Magcobar, has been appointed administrative assistant to Loe. Howard J. (Jack) Readle has been named special sales representative, according to John E. Lyons, sales coordinator.

Loe, employed by the company in 1946, was formerly executive assistant to the president and prior to that was purchasing agent for Magcobar.

Carson has been with Magcobar since 1952. Prior to that, he was associated with the Petroleum Division of the University of Texas.

Readle has served in purchasing functions in the oil industry over the past 30 years. Most recently, he was vice president of Gate City Steel Co.

Call your
BUTLER
Distributor for
precision-made . . .

TIGHT CLEAN

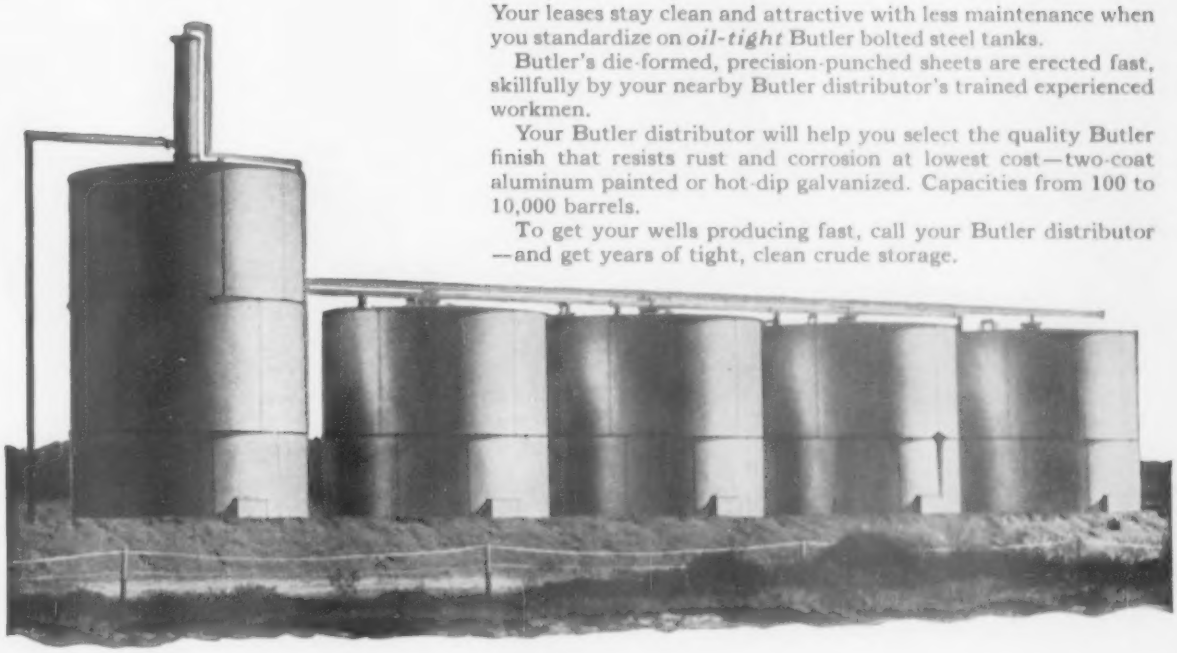
bolted steel oil tanks

Your leases stay clean and attractive with less maintenance when you standardize on *oil-tight* Butler bolted steel tanks.

Butler's die-formed, precision-punched sheets are erected fast, skillfully by your nearby Butler distributor's trained experienced workmen.

Your Butler distributor will help you select the quality Butler finish that resists rust and corrosion at lowest cost—two-coat aluminum painted or hot-dip galvanized. Capacities from 100 to 10,000 barrels.

To get your wells producing fast, call your Butler distributor —and get years of tight, clean crude storage.



UNION TANK AND SUPPLY COMPANY

Abilene, Texas	Nocona, Texas	Oklahoma City, Okla.	Denver, Colo.
Alice, Texas	Odessa, Texas	Tulsa, Okla.	Fort Morgan, Colo.
Beaumont, Texas	Hobbs, N. M.	Great Bend, Kan.	Sterling, Colo.
Dallas, Texas	Dubach, La.	Plainville, Kan.	Casper, Wyo.
Fort Worth, Texas	LaFayette, La.	Russell, Kan.	Newcastle, Wyo.
Houston, Texas	New Orleans, La.	Wichita, Kan.	Powell, Wyo.
Kilgore, Texas	Ardmore, Okla.	Kimball, Nebr.	Williston, N. D.
Midland, Texas	Cushing, Okla.	Sidney, Nebr.	Glendive, Mont.

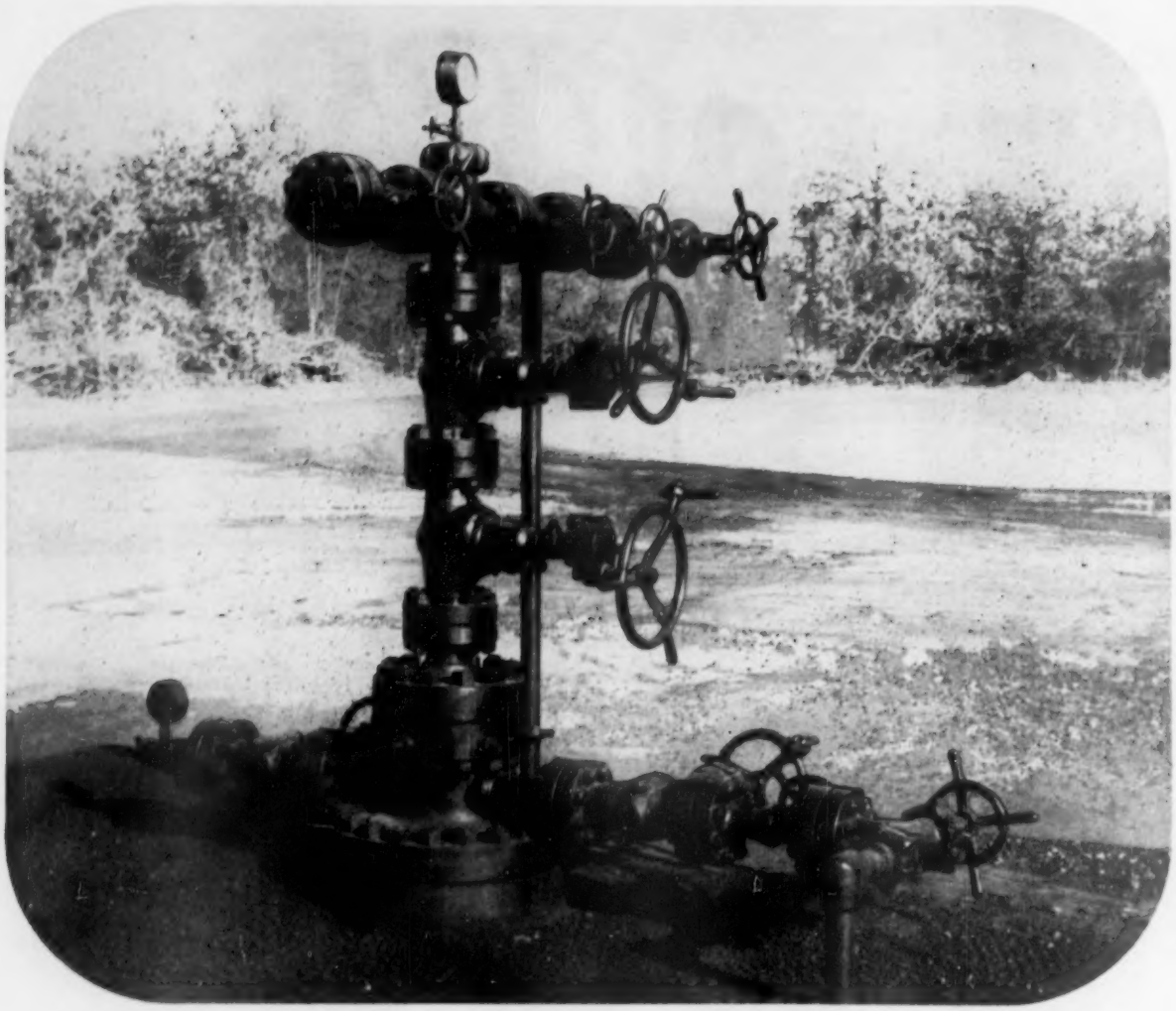
AMERICAN PIPE AND SUPPLY COMPANY
Casper, Wyoming Denver, Colo. Cut Bank, Montana

HARRY G. MILLER
El Dorado, Arkansas

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY
7464 East 13th St., Kansas City 26, Missouri

Manufacturers of Oil Equipment • Steel Buildings • Farm Equipment • Dry Cleaners Equipment • Special Products
Factories located at Kansas City, Mo. • Galesburg, Ill. • Richmond, Calif. • Birmingham, Ala. • Houston, Texas • Minneapolis, Minn.



"Congratulations RECTOR, *as you start your second quarter-century of service to the oil industry"*

ORBIT forged steel PRODUCTION VALVES are available through your favorite Well Head Manufacturer — ORBIT VALVE CO., TULSA.

ORBIT VALVES ®

EQUIPMENT MEN . . . in the News

He Made an Industry Safer

L. L. Rector's introduction of a safer wellhead brought greater safety and economy to America's oil fields.

THE story of Rector Well Equipment Co., which is celebrating its 25th anniversary this year, concerns only one problem and its solution: pressure shut-off between casing strings.

Laurence Leonard Rector has devoted the major share of his adult life to developing wellhead equipment to make the oil industry safer. He has built a multimillion-dollar business around a good idea that resulted in the organization of Rector Well Equipment Co. in 1930 to manufacture and sell the Rectorhead.

Rector was born in Wabash, Ind., before the turn of the century. At 15, he bought a ticket to industrial Muncie, Ind., ambitious to become the world's No. 1 machinist. On arriving there, thanks to the friendship of his father with the shop foreman of Gimmer Gear Works, he got a job as a tool boy. Before the end of the summer holiday, he was a master mechanic.

At 16, Rector decided to switch to railroading. He worked as a call boy for the Pennsylvania System, then became a yard clerk, and finally was made a crew dispatcher.

But the turning point in Rector's life came at 19 when he got a job in the mechanical department of the Kansas City Terminal Railroad, then the owner of two engines and four cars. It was while working there that Rector met John M. Crawford, of Parkersburg, W. Va., who was resting from a long trip in the private car of a major oil company. Before the train pulled out that night, Rector had talked to Crawford and had received his card with this admonition: "If you ever want to get in the oil business, call me collect. I'd like to have you on our payroll."

Switch to sales . . . A month later, Rector was a salesman in Tulsa for Parkersburg Rig & Reel Co. He reported in to A. M. Wertzberger, manager for Parkersburg in the Mid-Continent. In March 1918, he was moved to Ranger, Tex., as district manager over his company's initial sales outlet in that state.

Rector resigned his job a year later to supervise the building of Sun Oil Co.'s first camp in Ranger.

L. L. Rector, founder, Rector Well Equipment Co.

In 1920 he organized the Standard Tank & Steel Works at Ranger with Louis McFall, who owned the Ranger Boiler Works. The new firm took over the agency for Butler tanks.

The biggest deal Rector and McFall ever made . . . and it was the biggest of its kind on record at the time . . . was to sell a single order of 1,200 thousand-barrel tanks at $1,400 each. The order was signed by the district superintendent of a major oil company, and the shipment started rolling. There was only one hitch to this deal; the top brass in the company had kinfolks in a competitive tank company, and the order was cancelled.

Standard Tank & Steel Works was on the verge of ruin when Rector and McFall found that they could sell tanks to independent operators in the Corsicana, Tex., boom for $1,250 each by guaranteeing erection in 8 hours. They made this offer and made a deal with their erection crews to pay them $100 per tank if they put them up in 8 hours and only $25 per tank if it took them longer than that.

Through the tank business, Rector had come to know the owner of Fendsland Oil Co., who had given him all of its tank business. He gave Rector the opportunity of buying $10,000 in stock in Longhart Supply Co., exclusive agency for Hazard wire rope and a number of other good accounts. The investment was so profitable that Rector turned the tank business over to McFall and joined Longhart.

In October 1924, he moved to Casper, Wyo., to open a store. Then he expanded to an office and store in Denver, where he was given charge of the Rocky Mountain area. In less than a year he expanded the territory to include the Texas Panhandle and all of the Permian basin of West Texas.

In traveling for Longhart Supply, Rector met Frank Redick, shop superintendent for a major producing company. Redick had designed and patented a casing head in 1925. Rector liked the design and made a manufacturing connection for Redick with Stearns-Roger Manufacturing Co. in Denver. But the project soon ran into infringement trouble, and Stearns-Roger quit manufacturing the head.

A lucky meeting . . . In Amarillo in 1927, Rector was contacted by L. D. Hilton, whom he had previously met in Fort Collins, Colo. Hilton had a head design which he showed to Rector and the two of them decided to have a model built in a local blacksmith shop. When it was completed, they called C. I. Dean of Stearns-Roger in Denver. A deal was made whereby Dean would pay for a patent, give Rector and Hilton a one-quarter interest each in the head, and have Stearns-Roger manufacture it. Lew Hilton became a salesman for Stearns-Roger, and Longhart pushed the product until its dissolution in July 1930.

Meanwhile a firm of lawyers in California had dug up a prior-date patent and claimed infringement against what had become known as the Hilton head operating under the Dean patent. Stearns-Roger again bowed out of the casing-head manufacturing business. But Rector weighed the evidence, decided that the lawsuit was only a nuisance case, and entered the head business as Rector Well Equipment Co. in October 1930.

Rector engaged El Paso Foundry & Machine Co. as a manufacturer, bought out the Dean and Hilton interests, and began a one-man campaign to make well drilling, completion, and producing safer operations. But about the time the Rectorhead, which he dubbed "successor to the casing head," began getting acceptance in problem fields, his manufacturer closed up shop.

While he was moving his patterns and stock on hand to Roy Hammond's Lone Star Tool Co. in Wichita Falls, Tex., the California attorneys bobbed up again waving infringement papers.

(Continued on page 184)

RECTOR

25 YEARS . . .

. . . and 100,000 HEADS LATER

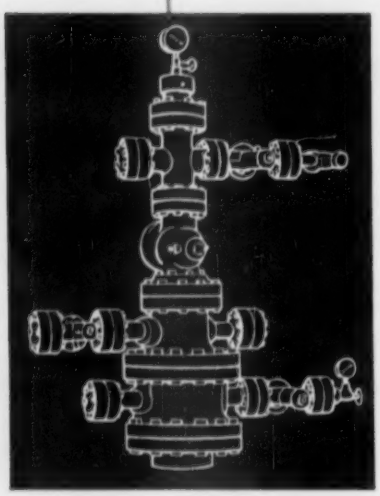
• Twenty-five years ago this month the RECTORHEAD, "Successor to the Casing Head," was introduced to the oil industry. Here, for the first time, was a casing head far removed from the glorified stuffing box in use at the time.

The RECTORHEAD serving as the foundation of the well, could be repacked under pressure so that in later years the inevitably deteriorated, leaky packing could be replaced without disturbing the well.

The simplicity of design was utilized in subsequent improvements which resulted in the permanent "METAL-TO-METAL" Seal that would not burn out, deteriorate, flow under high pressure or temperature; freeze and contract at low temperature; required no maintenance or replacements; and eliminated pressure equalization between strings. The soundness of its welded seal principle; the extreme efficiency of its application and service has been proven in thousands of trouble-free field installations and has put RECTORHEAD in the forefront of the casing head field.

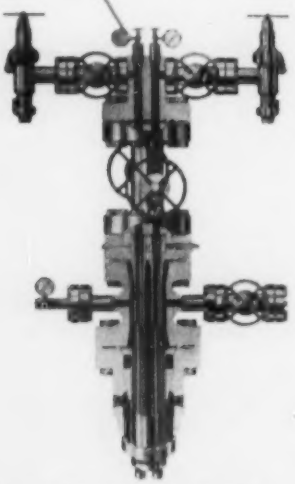
Keystone of the Rector Well Equipment Company, Inc., the RECTORHEAD has paved the way for other Rector products, all of which are contributing to "Making the Oil Industry Safer."

Looking forward from our first 25 years of service, the entire Rector organization is rededicated to serving the oil industry with new and improved products in keeping with the accelerated progress and efficient practices of the industry.



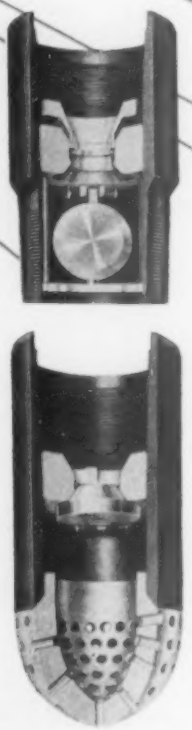
RECTORTREES

A natural step in the sequence of RECTOR service of "Making the Oil Industry Safer" was the assembly and testing of Christmas Trees in accordance with operators' specifications. Trees in pressures from 2,000 to 30,000 p.s.i. are assembled to our high standards established by many years of experience in casing and tubing head manufacture and well completion practices.



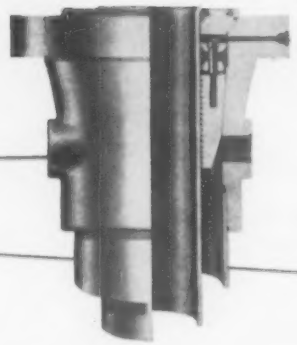
DUAL STRING HANGER FLANGE

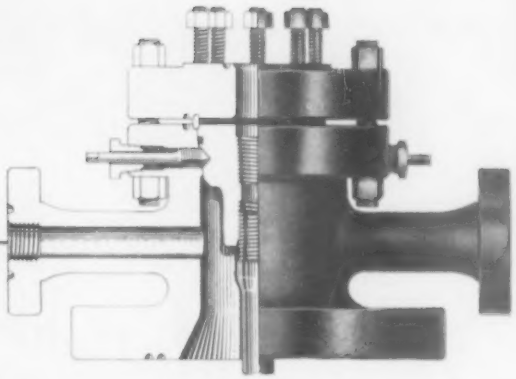
Most recent addition to the Rector group of equipment is the "Metal-to-Metal" seal for dual string completions. Each tubing string is suspended by a threaded mandrel hanger in individual full opening tapered bores in the flange. A metal seal ring seated in the groove at junction of each mandrel and flange establishes an independent seal for each string. Simplicity and flexibility assure maximum ease of installation with complete control of well.

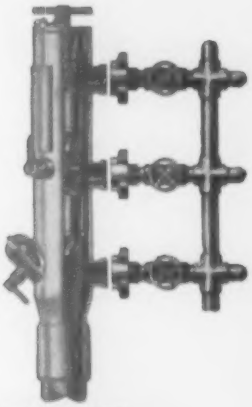


CONTROLLED FILL FLOAT SHOE AND COLLAR

This latest RECTOR development for improved cementing operations affords a controlled constant fill; can be converted to a float at any time by closing flapper valve in the collar; orifice in flapper valve in shoe permits circulating as desired while running casing with continued controlled fill. Internal parts of shoe and collar are an easily drillable aluminum alloy.





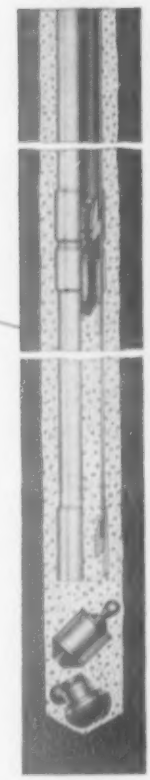


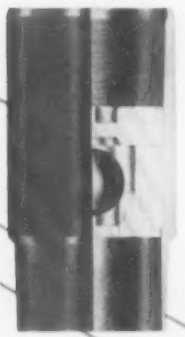
RECTORHEADS

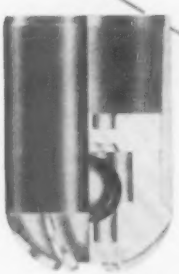
All present-day Rectorhead Casing Heads and Tubing Heads utilize the famous RECTOR "Ring of Steel" seal; are available for slip, threaded or welded mandrel suspension; flanged or threaded bottom; test pressures from 2,000 to 30,000 pounds. Special slip pack-offs; adapter assemblies; restricted ring groove; and other refinements make them the most efficient heads available to the industry today.

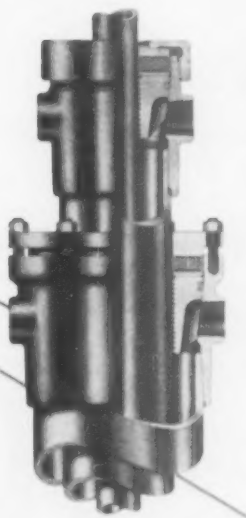
RECTORHEAD TUBING HEADS

In keeping with the RECTOR pattern of safety, these Heads utilize the RECTOR patented sealing medium wherein a single API Ring Gasket serves as pressure seal and hanger hold down. Three types of hangers are interchangeable in Type "M" bodies which are available with threaded, flanged, or studded side outlets; threaded or flanged bottom; in test pressures from 2,000 to 30,000 pounds. Stripper and ram type tubing heads are also available.









RECTOR REDHEADS

This series of forged steel casing and tubing heads are designed primarily for working pressures up to 2,000 pounds. Extremely flexible, they are adaptable to the widest possible range of applications. Casing heads have hinged slip suspension; tubing heads slip or mandrel suspension or special mandrels for Kobe pump. The seal is an oil-resistant rubber compressed on top of the slips by a bolted gland on casing heads and threaded cap gland on tubing heads.

ALL METAL CEMENTING SHOES AND COLLARS

RECTOR was the first to give the industry this type of equipment in all metal construction. The internal parts of both float shoe and collar are a special aluminum alloy which has much greater strength and abrasion resistance than conventional materials; is readily and easily drilled out. Its machinability guarantees precision fitting which assures perfect performance in cementing operations.

RECTORSEAL

Concerned with the troubles presented by thread leaks in casing and tubing connections led to the development of this sealing compound. For more than twenty years Rectorseal, impervious to all petroleum fractions, has assured leak-proof threaded connections wherever pipe is made-up in the oil field. The original formula has been improved and modified so that today Rectorseal is being used in many other industries where thread leaks have been a problem.

FULBORE CEMENTING METHOD

With the development of Fulbore Cementing, a simplified two-plug method, RECTOR has made these five basic requisites of cementing a practical reality:

1. Prevention of cement contamination
2. Closed circuit
3. Full casing discharge
4. Positive flow-back prevention
5. Impossibility to plug float

RECTOR WELL EQUIPMENT CO., Inc.

FT. WORTH • TEXAS • HOUSTON

Representatives In All Active Areas

Congratulations

to

RECTOR WELL EQUIPMENT COMPANY

on your Silver Anniversary

celebrating

25 YEARS

of Service to the Oil Industry

MID-CONTINENT TAKES PRIDE IN BEING ASSOCIATED WITH RECTOR WELL EQUIPMENT COMPANY AS A WORLD WIDE DISTRIBUTOR OF RECTOR PRODUCTS FOR "MAKING THE OIL INDUSTRY SAFER."

MID-CONTINENT

Supply Company

MID-CONTINENT BLDG. • FORT WORTH, TEXAS

EXPORT DIVISION: 45 Rockefeller Plaza, New York, New York

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

We are proud to furnish quality steel castings for Rector Well Equipment Co.

★ Christmas Tree Connections ★ High Pressure Casing Heads

★ High Pressure Tubing Heads ★ Flanged Crosses And Tees

★ And Many Other Rector Products

Another 22,000 pound shipment of Smith Steel castings — equivalent to a single day's production.

Smith takes pride in meeting the stringent quality requirements set by Rector and the excellent service record of Rector products in rugged oilfield use.

"Quality First" and "Service above Self" are slogans with meaning to Smith—a company large enough to serve you and small enough to know you. Write us today for complete information on our complete facilities.

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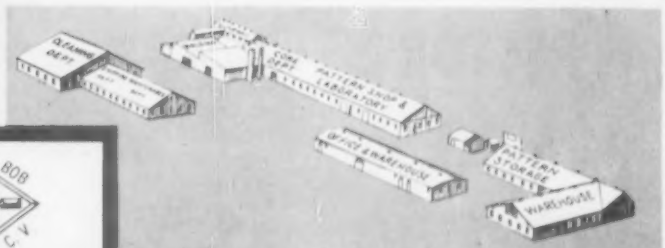

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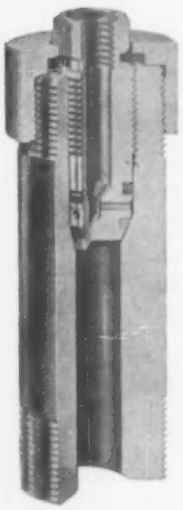

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Rector Well Equipment Co. in 1942 established its own manufacturing plant in Fort Worth, seat of the company's sales operation since its beginning.

A Houston plant was established in 1935 to produce Rectorseal, a patented chemical product for protecting pipe threads and facilitating making up and breaking out threaded connections.

In the early 1950's there were more than 50,000 Rectorheads in satisfactory application throughout the world. Heads applied in 1928 in West Texas fields, where original wells were put on back pressure, are still being repacked under pressure.

In 1948, Rector introduced "Fulbore" cementing equipment to the field, a two-plug method that offered a new and safe method in well cementing . . . an innovation to prevent channeling. Success of the Fulbore method (limited largely to problem holes) was followed by Rector's entry into conventional cementing equipment with a drillable aluminum alloy for all internal parts of float collars and shoes.

Improving the product . . . The Rectorhead, as it was originally designed, eliminated the soft packing used in casing heads of that day by placing a split metal ring on a recessed coupling to form a metal-to-metal seal. This method not only sealed in high pressures indefinitely, but permitted repacking under the highest of pressures.

Rector followed his original design with a welded-seal arrangement, but early models failed due to inadequate construction. So Rector improved the design and construction on later models to eliminate the necessity of a heavy welding flange. This did away with the need for preheating the flange before making the weld. It did away with the use of extra-long flange bolts. And, most important of all, it eliminated the possibility of breaking the weld when flange bolts are tightened.

The next major improvement was the Rector welding ring, especially designed and constructed to rest on a ground seat within the head body. Much smaller than customary welding flanges, the Rector welding ring is uniformly and simultaneously preheated with the pipe as the weld is being made. Neither the ring nor the weld is subjected at any time to strain or distortion such as flange bolts pulling against heat expansion.

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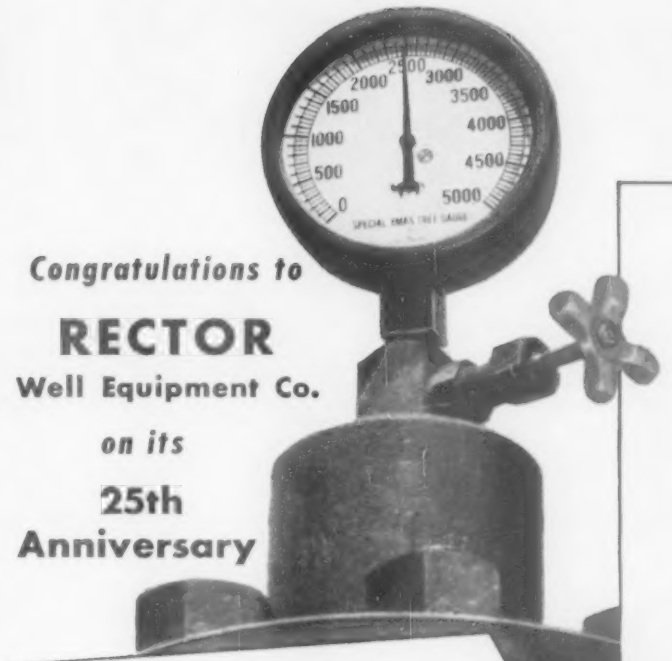

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The Oil and Gas Journal
Box 1260 Tulsa, Okla.

welding ring and inside the casing string, the seal is completed by an A.P.I. ring gasket at the junction of the welding ring and casing-head body. Half of the ring groove is machined in the welding ring, the other half in the head body. Then, when the subsequent head is bolted in place, the welding ring is held in its natural position and is securely seated in the body.

Rector welded seals require no maintenance or replacement during the life of the well. They are immune to the effects of corrosion inhibitors now being widely used in many oil-producing areas. There is no danger of a welded seal freezing and contracting, even in the lowest temperatures. Neither will a welded seal burn out in case of fire.

Klein Joins Catalytic Construction Co.

The appointment of George F. Klein, Jr. as chief engineer of Catalytic Construction Co., Philadelphia, has been announced by T. Ellwood Webster, president. Prior to his promotion, Klein was manager of the process-engineering department of Catalytic.

In his new position, Klein will be in charge of all engineering projects of the company under W. E. Kelley, vice president in charge of engineering.

Before joining Catalytic in 1954, Klein was chief engineer of Spencer Chemical Co. and prior to that held supervisory positions with National Aniline Division of Allied Chemical & Dye Corp. and Hercules Powder Co. He was also chief engineer of Refinery Engineering Co.

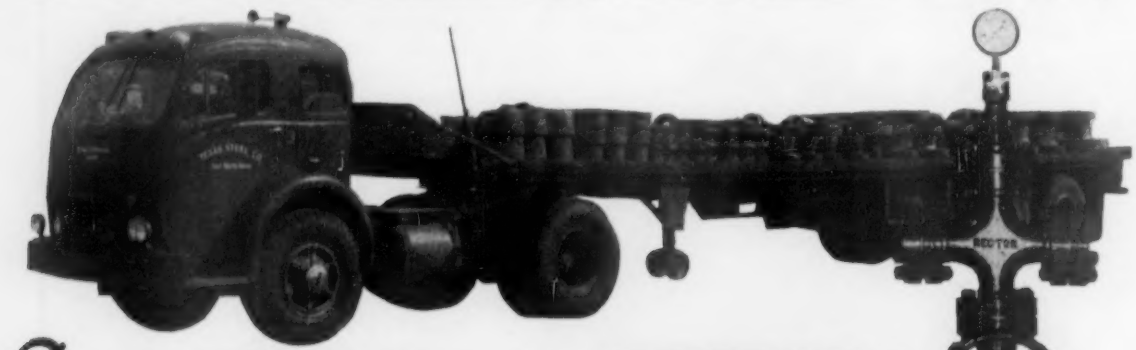
Cochrane Names George M. Wallace As Representative

The appointment of George M. Wallace & Co. to represent the complete line of Cochrane Corp., Philadelphia, has been announced by T. E. McBride, president of Cochrane.

George M. Wallace & Co.'s home office is in the Denham Building, Denver, with a branch office in the Dooly Building, Salt Lake City, under the management of R. E. Kunkel.

Republic Supply Moves Grayville, Ill., Store

The Republic Supply Co. has moved its Grayville, Ill., store to a new location on East North Street, according to M. N. Amsden, vice president and general sales manager. J. R. Cates is store manager and H. H. Haire, at Salem, is district manager for this area.



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It takes a lot of acceptance by the petroleum industry for a service company to put thirty-three markers in a map of the United States — each representing the installation and 24-hour maintenance of a complete, modern core analysis laboratory.

In this case, the thirty-third pin is Core Lab's newest facility — *Liberal, Kansas* — to be opened soon.

As has been the case many times before, the sole reason for establishing a new lab in a particular area is the operators' need for basic formation data — accurately developed by qualified field personnel, interpreted under the supervision of an experienced area resident manager, and made available back at the well site as rapidly as possible. We repeat — without this continued demand for core analysis and its acceptance as a key to the chain of formation evaluation events to follow — we'd have thrown away our box of map pins a long time ago.

There is *no adequate substitute*, either electrical or electronical, for the advantages of directly examining the basic product — the formation and its contents. And the cost of obtaining the best core analysis data available is small when immediate and long-range benefits are balanced against the total cost of reaching an exploratory goal.

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EXPLORATION

And Then There Were Seven . . .

by Frank J. Gardner

THE list of states with no oil production is shrinking. Let's hope it continues to do so. For if anything is effective in making a state's citizens conscious of the importance of the oil industry, it is a discovery at their own back door. No better illustration of this can be found than the sudden awakening of Alabama's citizens at Citronelle. That discovery may well swing the state to the right side of the industry's goals in Washington.

How many states now are dry? Only 18. The list shrank from 21 during 1954 when South Dakota, Nevada, and Arizona became discovery debutantes. Of the 18, how many are possible producers? Probably only 7. Of the seven, how many may be expected to become major producers? Probably none.

Thirty of the forty-eight states are now producing oil. Three more are producing or have produced gas. The seven most likely oil states of the future are marked with question marks. Dates on each state mark the time of first discovery.

Question marks . . . Each of the seven candidates is marked with a question mark on the map. They are Georgia, Idaho, Iowa, North Carolina, Oregon, South Carolina, and Washington. Idaho scored its first commercial gas well just this year, and small gas flows have been discovered in Washington and Oregon. Georgia aches for oil, but so far the score there is zero, despite the state's posted reward of $100,000 for the first oil well. Iowa has no production, but considerable drilling has been done in her Forest City basin. The Carolinas have had but little subsurface exploration, but thick coastal plain sediments and the reports of seeps and shows from those two states should not be ignored in our discovery thinking.

And criteria . . . What criteria determine a state's being classified as "probable," "possible," or "impossible" for oil production? The American Association of Petroleum Geologists has advanced five criteria. These are:

1. The volume and character of sediments present.

2. Evidences of oil and gas (seeps, showings, etc.).

3. The presence of unconformities.

4. The presence of wedge belts of porosity.

5. The presence, nature, and extent of folding and faulting.

All of the selected seven states mentioned above fit these criteria. There are still other states that fit some, but not all of them. All geologists can say is that these seven hold the best possibilities. If an area produces oil, we know pretty well that it will produce gas. If it produces gas, we **believe** it will eventually produce oil.

Narrow the odds . . . With these facts to go on, then, we can narrow the odds still further. Of the selected seven, there are three that have produced or are producing gas—Idaho, Washington, and Oregon. So place your bets on one of the three northwestern states, and the odds are better than even that you'll come out ahead.

But broaden the vision . . . Does this shrinking of the list of future oil states mean that we're running out of places to seek for oil? Not at all. Conversely, it is a reflection of progress. Nobody has stated this more aptly than the late Max W. Ball. In his foreword to the A.A.P.G. 1951 Symposium on Possible Future Oil Provinces, Ball said:

"The 1941 symposium catalogued the possible future petroleum provinces of the United States and Canada as geologists then listed them. In the 9 years that have passed not a province has been condemned. . . . In those 9 years the possibilities of additional provinces have come to be recognized. The list is longer today than it was in 1941. Despite the dry holes that have been drilled, despite the oil and gas fields that have been found, we know of more possible future petroleum provinces—more possible sources of future supply—than we did 9 years ago."

Will these tests do it? . . . In the four states having the best prospects for production, thirteen closely watched wildcats are under way. Oregon leads with seven tests drilling. Georgia is second with three. Two are drilling in Idaho, one in Washington.

Ten major oil companies have leases in Oregon. The most encouraging is a Sinclair Oil & Gas Co. wildcat in Lane County in the western part of the state. Drilling is continuing below 6,500 ft. Standard Oil Co. of California has moved a rig to Crook County in the central part of the state, and is below 5,315 ft. Five other wells are being drilled by small operators in central, western, and southern Oregon. Humble Oil & Refining Co. is doing seismic work in the Deschutes basin. Since 1905 200 wells have been put down, but the state remains virgin wildcat territory.

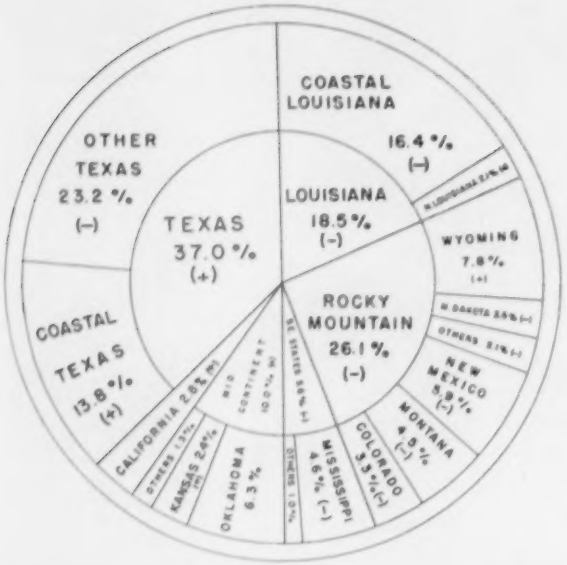

Fig. 1—Distribution of seismograph prospecting in the United States in the first 6 months of 1955.

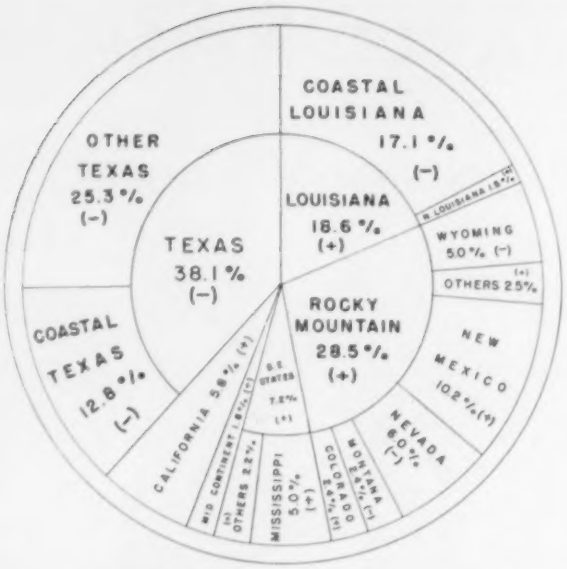

Fig. 2—Distribution of gravimeter prospecting in the United States in the first 6 months of 1955.

For the first 6 months of 1955 . . .

Geophysical Activity Increases 5 Per Cent

by Sigmund Hammer

GEOPHYSICAL activity in exploration for petroleum on a global scale during the first 6 months of 1955 recorded a 5 per cent increase in rate compared to the total for the previous year. This reverses the downward trend in 1954. However, the rate of geophysical activity so far in 1955 is 1.9 per cent short of equaling the all-time record high of 1953.

Author is with Gulf Research & Development Co., Pittsburgh. Excerpted from a report of the standing committee on geophysical activity of the Society of Exploration Geophysicists. The members of the committee are: Kenneth L. Cook, Herbert Hoover, Jr., C. C. Lister, Walter S. Olson, Kumiji Iida, A. Garcia Rojas, and Sigmund Hammer, chairman.

The world-wide exploratory effort during the first half of 1955 utilized the average full-time services of 1,084 geophysical crews of all kinds. This is an increase of 48 crews compared to the 1,036 crew total which operated in 1954.

The statistics in the present report represent geophysical activities during the first half of 1955. Comparisons with previous annual statistics, which are made throughout the report, are based on the assumption that the reported rates of activity in the first 6 months of 1955 will continue for the rest of the year. No seasonal adjustments have been made.

The global distribution of geophysical activities during the first 6 months of 1955, by area and by method, and rated comparisons with the whole-year statistics for 1954 are given in Table 1. Reducing the crew-months statistics to crew-years, we find that the global effort during the first half of 1955 utilized the average full-time operations of various kinds of geophysical crews as follows: seismic, 893; gravity, 161; magnetic (both airborne and ground), 18; others, 12. The changes compared to 1954 on a world-wide basis were: seismic, up 31; gravity, up 23; magnetic, down 2; others, down 4.

In the United States and Canada,

TABLE 1—CREW-MONTHS OF GEOPHYSICAL EXPLORATION FOR PETROLEUM
(1955 data are for first 6 months only)

	United States			Canada			Western Hemisphere			Eastern Hemisphere			World		
Method—	1954	1955	Change in rate (%)	1954	1955	Change in rate (%)	1954	1955	Change in rate (%)	1954	1955	Change in rate (%)	1954	1955	Change in rate (%)
Seismic	6,863	3,536	+3	1,535	746	−3	9,209	4,711	+2	1,130	645	+14	10,339	5,356	+4
Gravity	997	587	+18	108	54	0	1,302	760	+17	357	205	+15	1,659	965	+16
Magnetic	109	34	−38	9	0	−100	158	53	−33	71	57	*+61	238	110	−8
Other							162	7	*−91	35	65	*+271	197	72	−27
Total	7,969	4,157	+4	1,652	800	−3	10,831	5,531	+2	1,593	972	+22	12,433	6,503	+5

*Suspected incompleteness of reports suggests these large changes are questionable.

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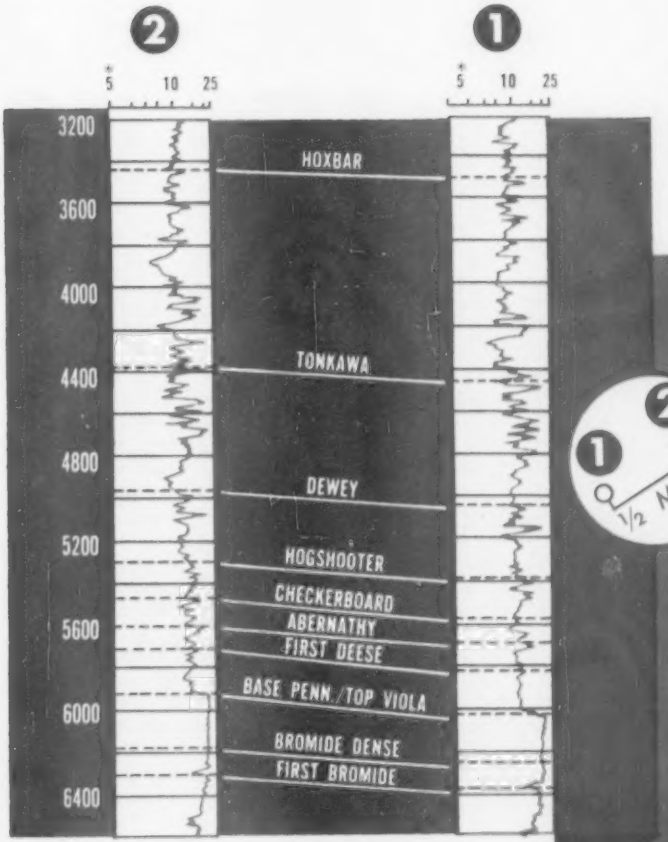

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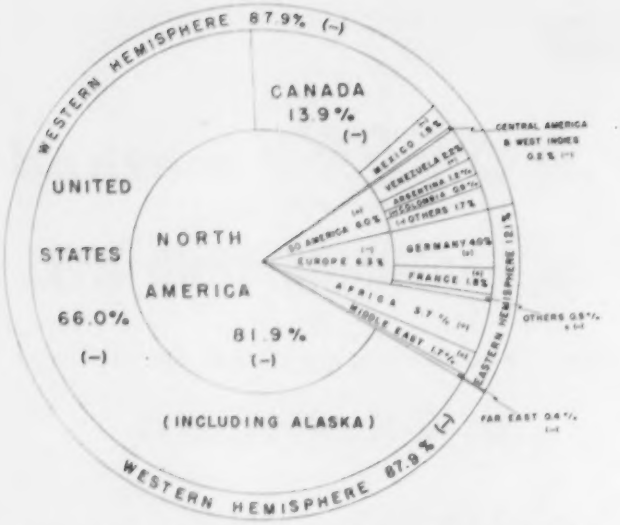

Fig. 3—World distribution of seismograph prospecting in the first 6 months of 1955.

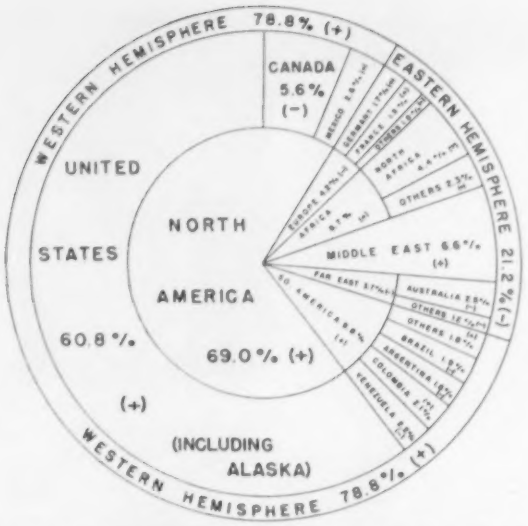

Fig. 4—World distribution of gravimeter prospecting in the first 6 months of 1955.

the average full-time number of seismic crews totaled 714, up 14. Gravity crews totaled 107, up 15. Magnetic crews averaged 6, down 4.

Major increases in geophysical activity were made in the Eastern Hemisphere, which rose 22 per cent. This great apparent increase may reflect, in part, suspected incompleteness of the 1954 reports to the committee. The United States scored a 4 per cent increase. Canada was down 3 per cent. The Western Hemisphere as a whole was up 2 per cent.

Classified by methods, the greatest percentage increase of activity was in gravity surveying, which globally rose 16 per cent. Seismic activity increased 14 per cent in the Eastern Hemisphere and recorded moderate rises in all other areas except western Canada where a 3 per cent decrease was indicated. Magnetic activity decreased 8 per cent globally. A great percentage increase in the use of this method in the Eastern Hemisphere did not overcome substantial drops in the Western Hemisphere. No magnetic surveying in petroleum exploration was reported in Canada.

Upward Trend

Seismic operations show a definite upward trend during 1955. This reverses the downward trend which characterized the two previous years. A total of 609 seismic crews were operating in the United States at midyear. This is an increase of 81 crews since the low of 528 crews in November 1954. But it is still far below the peak number of 710 crews which were in operation in October 1952. Gravity operations in the United States up to midyear 1955 continued at a relatively uniform rate. The number of gravity crews in operation during the 6-month period averaged 98, 18 per cent higher than in 1954.

Canada . . . Considerable fluctuation in activity is apparent during the first half of 1955 in both gravity and seismic methods. The number of seismic crews ranged from a high of 150 in March to a low of 100 in April. This fluctuation is largely seasonal and reflects differences in mobility of the field crews on the frozen muskeg in winter and during road bans when the frost goes out in the spring.

The number of seismic crews operating in Canada during the first half of 1955 averaged 124, down 4 compared to 1954. At midyear 110 seismic crews were active. Gravity crews ranged from 6 to 13 with an average of 9 during the first 6 months of 1955. A total of 10 gravity crews were reported active in Canada at midyear.

United States . . . The geographic distribution of seismic operations in the United States during the first half of 1955 is shown in Fig. 1. Changes in relative concentration of effort in various areas are indicated on this chart and also on Figs. 4, 5, and 6 by (+) or (—) signs showing increase or decrease compared to 1954.

Texas and Louisiana, as for several years past, continue to dominate the

TABLE 2—SEISMOGRAPH CREW-MONTHS IN THE UNITED STATES

State—	1954	First 6 months of 1955 Company	Contract	Total	Change in rate (%)
Texas	2,107	534	773	1,307	+24
Louisiana	1,303	198	455	653	+ 0.2
Wyoming	535	136	141	277	+ 4
Oklahoma	441	110	113	223	+ 1
New Mexico	465	126	82	208	—11
Mississippi	233	77	86	163	+40
Montana	456	58	102	160	—30
Colorado	228	48	69	117	+ 3
California	180	27	74	101	+12
North Dakota	284	47	40	87	—39
Kansas	136	42	42	84	+24
Others	495	71	85	156	—37
Total	6,863	1,474	2,062	3,536	+ 3

TABLE 3—GRAVITY CREW-MONTHS IN THE UNITED STATES

State—	1954	First 6 months of 1955 Company	Contract	Total	Change in rate (%)
Texas	439	123.75	99.5	223.25	+ 2
Louisiana	183	37.5	71.5	109	+ 19
New Mexico	39	14	45.5	59.5	+205
Nevada	80	5	30	35	— 12
California	48	10	24	34	+ 42
Mississippi	39	18.5	11	29.5	+ 51
Wyoming	57	6	23	29	+ 2
Colorado	15	2	12	14	+ 87
Montana	28		14	14	0
Others	69	7	31.5	38.5	+ 12
Total	997	223.75	362	585.75	+ 18

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chart. These two states together accounted for 55.5 per cent, more than half, of all seismic activity in the United States. The outstanding shift of activity was into coastal Texas (including the Texas portion of the Gulf of Mexico) where the intensity of seismic exploration more than doubled compared to 1954. Coastal Louisiana (including the Louisiana portion of the Gulf of Mexico) recorded a 2.1 per cent decrease. Considerable seismic effort was continued in the Rocky Mountain states although at a slightly lower rate than in 1954.

The mid-continental states marked a moderate increase, due mainly to augmented seismic activity in Kansas. Moderate decreases in seismic operations were made in Texas, outside the coastal area, and in Montana and North Dakota. Other changes and shifts in seismic explorations in the United States are listed in Table 2.

Table 2, as well as Table 3, for the first time gives a breakdown of work done by company-owned and by contract crews. It is of interest to note that 58.3 per cent of the reported work was done by contract seismic crews compared to 41.7 per cent by company-owned seismic crews.

The areal distribution of gravimeter work in the United States in the first 6 months of 1955 is shown in Fig. 2. Texas and Louisiana, again as with seismic activity, accounted for more than half of all gravity work in the nation. However, the total percentage (56.7 per cent) was smaller than in 1954 when these two states accounted for only slightly less than two-thirds of the national total of gravity work. The greatest increase in concentration of gravity activity was in the Rocky Mountain area, principally in New Mexico. The only other major shift was in Texas where gravity work decreased 6.0 per cent compared to the average rate in 1954. Other data on gravity explorations are given in Table 3.

Almost two-thirds of the reported gravity work was done by contract crews. The precise percentages recorded were: contracted gravity crew-months 61.8 per cent, company-owned gravity crew-months 38.2 per cent.

World-Wide Exploration

The world distribution of seismic exploration for petroleum during the first half of 1955 is shown in Fig. 3. North America continues to dominate the chart with 81.9 per cent of the world total of seismic activity. However, significant relative increases were recorded in South America and in the Eastern Hemisphere. Although the number of seismic crew-months worked actually increased in the United States and Canada, the relative larger increases in other parts of the world reduced their percentage participation in the world total. The greatest percentage increase in seismic work took place in Africa, although there were no spectacular shifts in seismic activity compared to 1954.

The world distribution of gravimeter explorations for petroleum during the first half of 1955 is shown in Fig. 4. More than two-thirds of all gravity activity was concentrated in North America. Substantial increases in relative effort were recorded in Africa and the Middle East. A significant drop was reported in the Far East. Although the level of activity increased over-all, there was a minor shift of percentage effort in 1955 compared to 1954 from the Eastern Hemisphere into the Western Hemisphere.

The reported statistics on magnetic explorations continue to be fragmentary and do not completely differentiate between aeromagnetic and ground-magnetic crews. Since these two procedures represent a tremendous difference in effort, both in cost and in coverage, a bare statement of the total number of magnetic crew-months worked does not give a reliable measure of the actual effort by the magnetic method.

Taken at face value, the reported statistics in Table 1 indicate a global decrease in magnetic operations. A substantial increase in magnetic activity was recorded in the Eastern Hemisphere, but decreases in the United States and Canada were so large that the world-wide total showed a net 8 per cent decrease. The indicated number of magnetic crews employed full-time in petroleum exploration during the first half of 1955 was 6 in the United States and 18 globally.

Higher Costs

Cost data reported to the committee on geophysical explorations are incomplete. However, it appears that unit costs were somewhat higher than in 1954. For this reason, and also because the level of geophysical activity during the first half of 1955 was higher than in 1954, it is quite certain that investments in geophysical prospecting are now being made at a higher rate than a year ago.

If the high level of activity in the first half of the year continues, it is probable that the total capital investment in geophysical exploration during 1955 world-wide will be between $350,000,000 and $400,000,000. In the United States the geophysical investment for the year will probably range between $200,000,000 and $250,000,000.

EXPLORATION HIGHLIGHTS

Canadian Crews Wait for Winter

THE big freeze in western Canada is fast drawing nigh. With it comes the annual exploratory push into the northern sections of Alberta and British Columbia. Seismic equipment is being readied for the busy winter months in areas that are accessible only during that time of the year.

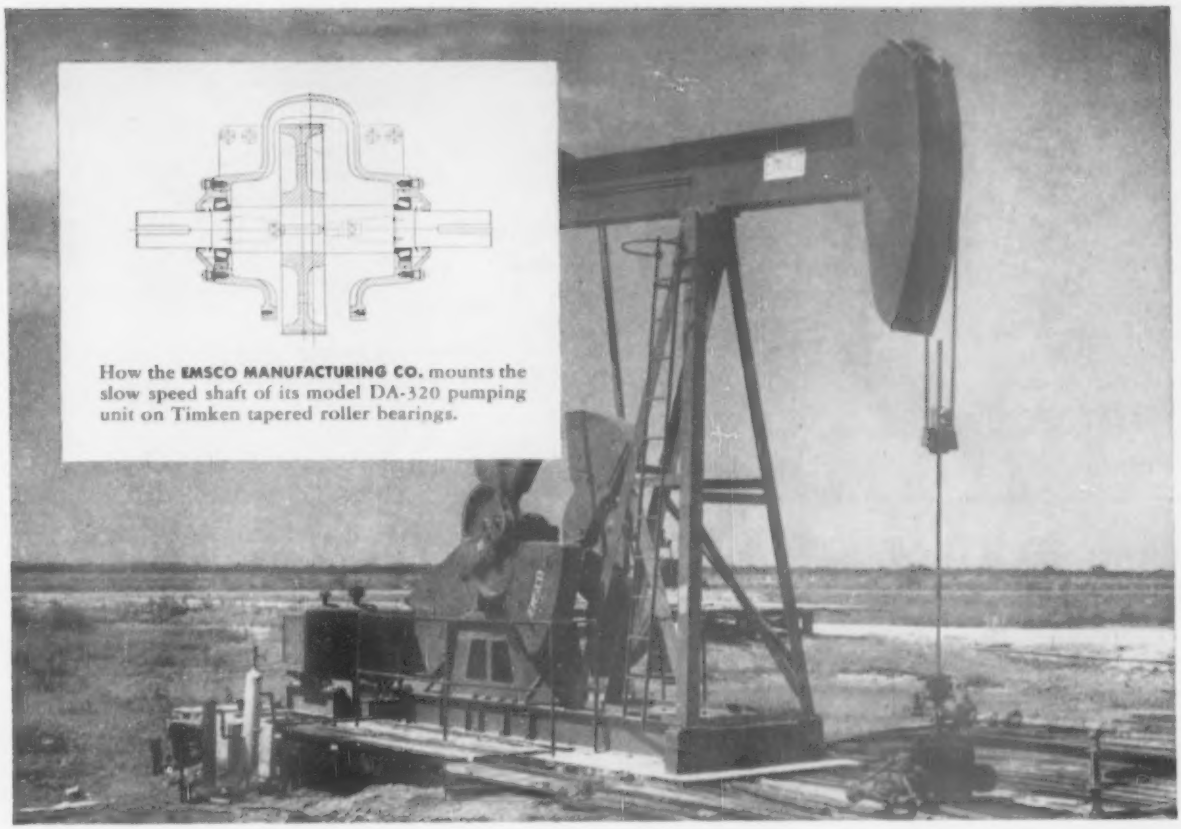
Big plans . . . All indications point to an active winter in the northern areas, explorationwise. The northeastern section of British Columbia and northwestern Alberta will see about 75 per cent of the winter's seismic activity. Most of it will be focused on the area lying north of Grande Prairie in Alberta to the Fort Nelson area of British Columbia.

The remaining 25 per cent of Canada's winter seismic work will be scattered along the Foothills Belt and in the prairies. Refraction and reflection shooting both are scheduled for the foothills region. The big target here will be the region's many folds and faults.

Fewer crews . . . There will be a few less active crews in western Canada this winter. Estimates promise at least 150 active seismic crews, compared to 170 last February.

The Canadian Government has placed a 10 per cent sales tax on geophysical

Plans are being completed for the annual trek into the northern regions of Canada by seismic crews. Thousands of square miles will be covered in a region accessible only in winter.



How the **EMSCO MANUFACTURING CO.** mounts the slow speed shaft of its model DA-320 pumping unit on Timken tapered roller bearings.

How TIMKEN® bearings hold shafts in alignment on all Emsco pumping units

EMSCO pumping units use herringbone gears. This means the bearings on the slow speed shaft must locate all the other shafts. And shaft alignment is important. These bearings must also take the radial loads from the slow speed gear and the overhung cranks.

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Result: end play and deflection are minimized; shafts are held in proper alignment; gear wear is reduced.

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Emsco makes sure its customers get all these advantages. The slow speed shafts on its entire line of pumping units are on Timken bearings. You can get these same advantages by specifying Timken bearings on all the oil field equipment you build or buy. Just look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.

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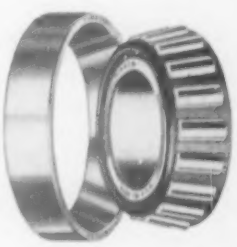
The special grade alloy steel which gives Timken bearings their strength and resistance to wear is made in our own steel mills.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. nickel-rich Timken alloy steels.

TIMKEN

TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

equipment coming into that country from the U. S. This tax will curtail some American equipment.

Economics will keep the push into the foothills region to a small-scale program. The rugged country and rough drilling conditions up the cost of wildcat wells into the over-$1,000,000 category. It will take some time yet before concentrated drilling gets under way in this newest of Canadian petroleum provinces. A great deal of detailed study is needed beforehand.

Seismic work and subsequent exploration is expected to be average out on the prairies of Alberta and Saskatchewan. The ever-brightening market situation in Canada will hoist development and exploratory drilling in this region this winter and spring.

WESTERN CANADA

ALBERTA

Important Tests Announced At Savanna Creek Project

Phillips Petroleum Co. and Husky Oil & Refining-Northern Natural Gas Co. have announced important results from drill-stem tests run at the 2A Savanna Creek well. The well is located in the Savanna Creek area in the high foothills of the Canadian Rockies about 65 miles southwest of Calgary.

The 2A Savanna Creek is on LSD 5, 21-14-4w5. The Rundle zone of the Mississippian was topped at 7,146 ft. During test of the interval 7,700-7,832 ft. gas flowed at the rate of 8,400 M.c.f. per day. This well is 1 mile east of the No. 1 discovery well. That well flowed gas from four separate intervals of the Mississippian for an aggregate rate of over 50,000 M.c.f. daily.

The two most significant facts concerning the step-out are that the current tests were run on an inteval which is considered to be about 200 ft. stratigraphically above the highest zone from which production was obtained in the discovery well. The No. 2A well has shown the crest of the structure to be at least 1 mile wide. In the foothills belt other major gas pools are known to be considerably narrower. The stepout is coring ahead below 7,832 ft. and is expected to find the top producing horizon of the No. 1 well at about 7,900 ft.

Gas Discovery Reported At Turin Area Wildcat

Western Leaseholds, Ltd., recorded a gas discovery at its wildcat in the Turin area, 5 miles south of Turin railpoint and 17 miles northeast of Lethbridge. The new strike, Western 10-11 Turin, was drilled on LSD 11, 10-11-19w4. It flowed gas at a maximum daily rate of 3,170 M.c.f. during initial test in the basal Blairmore formation.

The initial test of the interval 3,523-55 ft. flowed gas to the surface in 1 minute and built up to a maximum of 3,170 M.c.f. per day. There was no pipe recovery.

This discovery well lies 4½ miles southeast of 33-7 Turin, a gas well that indicated commercial volume from both the Bow Island sand and the basal Blairmore.

Basal Quartz Gas Production Assured at North Clive Well

Imperial Oil, Ltd., has been assured of basal Quartz gas production at its wildcat 2¾ miles north of Clive in central Alberta. This test is scheduled for completion after testing the Devonian and crew is drilling toward its main objective.

The well, Imperial 11-8 North Clive, LSD 11, 8-41-24w4, is 1½ miles southeast of a California Standard well that found gas in the Lower Cretaceous and failed to find oil or gas below the basal Quartz. That Cal-Standard well was capped as a potential gas well following production tests. The nearest producer in the Clive Devonian oil area is 4½ miles south of the new Imperial well. During the test of the interval 5,133-56 ft. gas flowed a daily maximum rate of 4,225 M.c.f. Recovery consisted of 130 ft. of distillate.

SASKATCHEWAN

Two Discoveries Go on Provincial Records

Imperial Oil, Ltd., registered oil discoveries at two of its wildcats in southeastern Saskatchewan last week. One of the sites, Imperial-Canadian Superior 1-25 Lampman, lies 2½ miles northeast of oil production in the Lampman field area and 8 miles northwest of Steelman oil field. The other, the third strike in the township in recent weeks, 15-7 Ingoldsby, is 1⅞ miles northwest of the 3-9 Ingoldsby and 2 miles southwest of the 3-21 Ingoldsby discovery well.

The Lampman well, Imperial 1-25 Lampman, LSD 1 25-5-6w2, found oil in both the Charles and Mission Canyon. The other well, 15-7 Ingoldsby, LSD 15, 7-4-31w1, found oil in the Mission Canyon which was topped at 3,530 ft. Completion operations are being carried out at both these wells.

PACIFIC COAST

CALIFORNIA

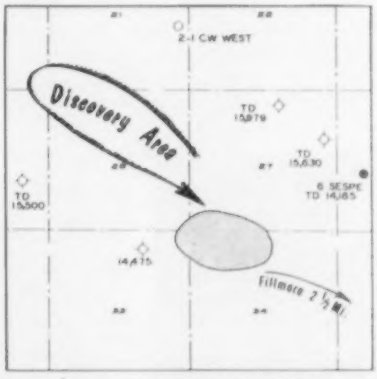
Standard Stakes Out New Fillmore Wildcat

Standard Oil Co. of California has staked out another deep test site in its exploration of the Fillmore area in Ventura County. This latest wildcat, 2-1 C. W. West, is located NE SE 21-4n-20w, which is approximately 1½ miles northwest of production. It is slated to go to 17,000 ft.

Standard recently extended the field to the northeast by completing 6 Sespe Ranch 1 mile from production. This wildcat was brought in producing 1,097 bbl. daily of 29.2°-gravity crude through a 24/64-in. choke. Producing interval of 6 Sespe is 14,050-14,180 ft. Total depth of the well is 14,185 ft.

So far Standard has successfully completed four producers while registering five dry holes. The field discovery well, 1 Sespe Ranch, was completed in April 1954, at the producing interval of 14,170-14,235 ft.

Efforts to extend the field directly west failed. Standard's 5 Sespe Ranch, ½ mile west of the discovery well, suspended operations recently at 14,475 ft. Two other tests northeast of the discovery well were abandoned as dry at almost 16,000 ft.



A new deep test site has been staked in the Fillmore area of Ventura County. The Standard Oil Co. of California wildcat will go down to 17,000 ft.

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Middle Dome Corp.'s Deep Test Nears Total Depth

The Kettleman Middle Dome Corp. is nearing the projected total depth of 13,500 ft. with its 38-19V well in the Kettleman Middle Dome field. Drill-stem tests at the 12,917-13,026 ft. interval recovered good formation oil shows. However, the sands were too tight to produce in commercial quantities. This well is a joint operation between Standard Oil Co. of California and Bolsa Chica Oil Corp. on a 72-25 per cent basis.

Depth Record Near

A new deep drilling record for Cuyama Valley was in prospect as Richfield Oil Corp.'s 33-35 F. K. Perkins was drilling ahead at 12,891 ft. This wildcat, which is seeking Cretaceous pays, is located in 35-1-26 on the floor of Cuyama Valley. The depth record for the field was set 4 years ago by Richfield C-2 Russell at 12,981 ft.

Tidelands Well Spudded In

Monterey Oil Co. last week spudded in its first well on its newly acquired tidelands in West Newport Beach, Orange County. This initial test of Monterey's state tideland lease No. 1549 is located on an upland site in Section 19-6s-10w.

Meanwhile, Monterey was drilling ahead with its tenth well from its artificial island site off Seal Beach. Production from the nine wells completed so far is 1,400 bbl. daily.

Shell Finds New Zone

Shell Oil Co. last week completed its 3 SPS in a new zone in the recently discovered Saticoy field in Ventura County. This well, Shell's second completion in this new field in the Briggs district, was brought in for 516 bbl. a day of 33.5°-gravity crude through a 14/64-in. choke. The well also made 318 M.c.f. of gas.

It was taken to 7,881 ft. and then plugged back to the producing depth of 7,180 ft. Completion was made in a new zone labeled the B zone. Shell's other well in the Saticoy field, 2 SPS, was completed for 500 bbl. daily. It is now producing 260 bbl. a day.

First Lakewood Test

The new city of Lakewood in the Los Angeles Basin had its first test spudded in last week. Standard Oil Co. of California's 1 Weingart, located on the southern edge of the town, is a slant hole to evaluate oil possibilities north of The Texas Co.'s Long Beach Airport lease.

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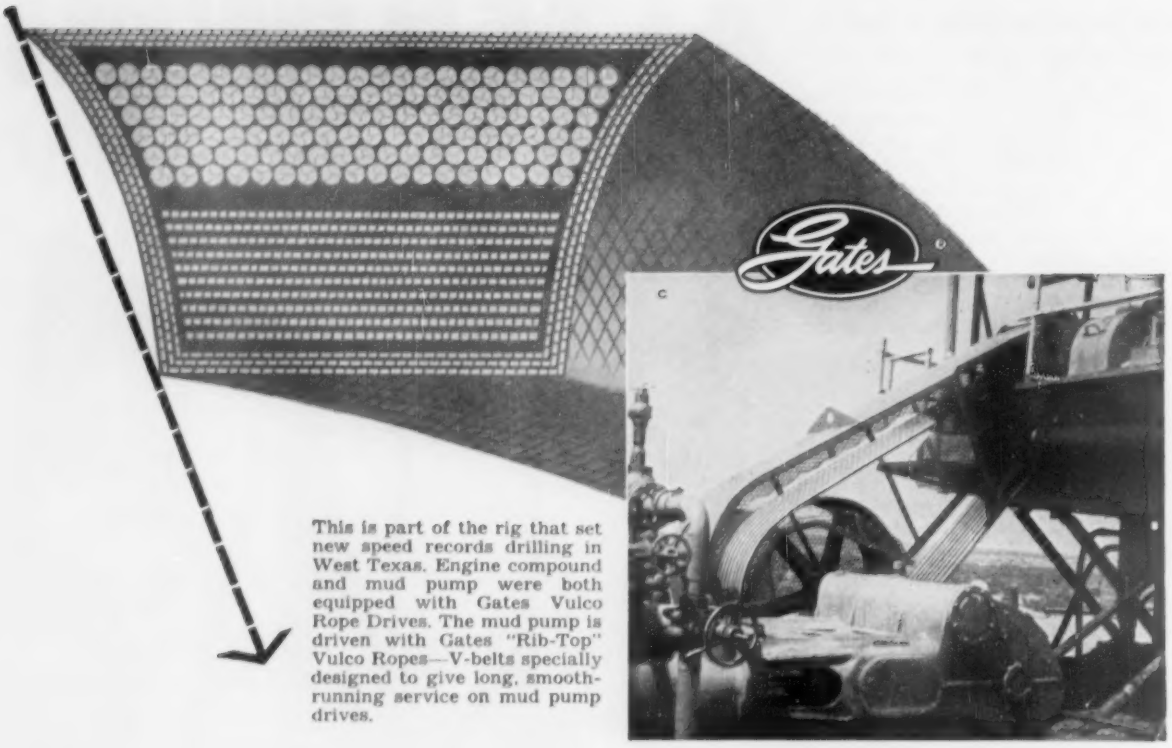


This is part of the rig that set new speed records drilling in West Texas. Engine compound and mud pump were both equipped with Gates Vulco Rope Drives. The mud pump is driven with Gates "Rib-Top" Vulco Ropes—V-belts specially designed to give long, smooth-running service on mud pump drives.

Concave sides keep belt costs down!

Industry is saving thousands and thousands of dollars every year by specifying Gates Vulco Ropes—the V-Belts with *concave sides* (U.S. Pat. No. 1813698).

Here's the interesting reason *why* Gates belts save money:

On the bend around the sheave the *precisely engineered* concave sides (Fig. 1) of the Gates belt fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley. That means sure pulling power and *even distribution of wear*. Longer wear, fewer replacements cut belt costs...reduce down time...contribute to profits.

Simple test proves value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. The bulging sides prevent the belt from fitting evenly in the pulley groove (Fig. 2-A). Uneven contact causes uneven wear...shortens belt life...increases costs.

Keep belt costs *down* by specifying Gates Vulco Rope Drives—the V-Belt with *concave sides*. Belts you need are readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 25-C

GATES VULCO ROPE DRIVES

WEST TEXAS-NEW MEXICO

WEST TEXAS

Stanolind Presents Rig to Texas Western College

EL PASO.—A $100,000 experimental seismograph drilling rig has been presented to Texas Western College here by Stanolind Oil & Gas Co.

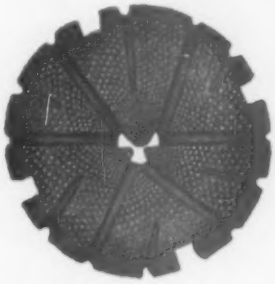
The rig, called the largest of its kind in the world, was acquired through the efforts of the Trans-Pecos Student Section, Society of Exploration Geophysicists, and will be used by the T.W.C. Department of Geology. The equipment is part of a $2,000,000 research and petroleum exploration program by the Student Section at T.W.C. Several of the country's leading oil companies are participating in the program.

Stanolind Oil & Gas Co. has presented Texas Western College a $100,000 experimental seismograph drilling rig. The rig is the largest of its kind in the world. Shown with the equipment are: (left to right) Dr. H. E. Quinn, chairman of the geology department; Dr. L. A. Ne'son, professor of geology; J. T. Semple, council chairman of the Student Section, and Charles Evensen, assistant professor of geology.

Central Howard County Test Flows Silurian Oil

North-central Howard County had prospects of another good strike at Phillips Petroleum Co. 1 Satterwhite, in 12-32-T1N-T&P Survey. Location is about 5 miles southeast of similar production in Luther field, and field sources showed the possibilities of a

the answer to many of your drilling problems



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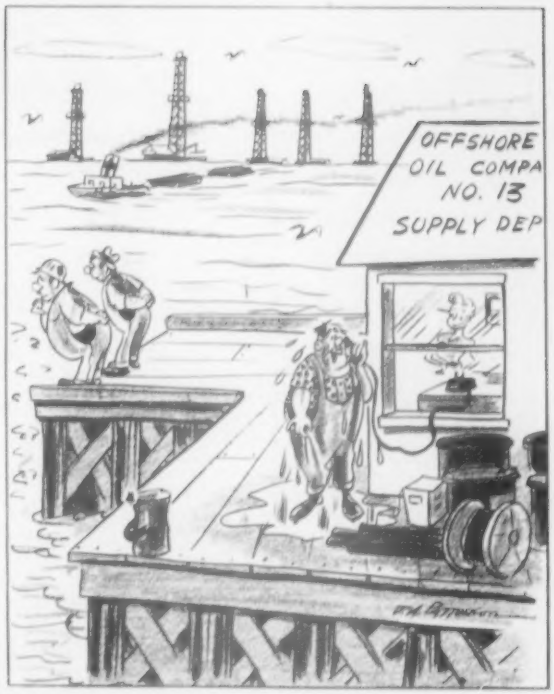


"Guess what happened to that barge load of pipe, boss—no—no—guess again!"

Siluro-Devonian pinchout comparable to that field.

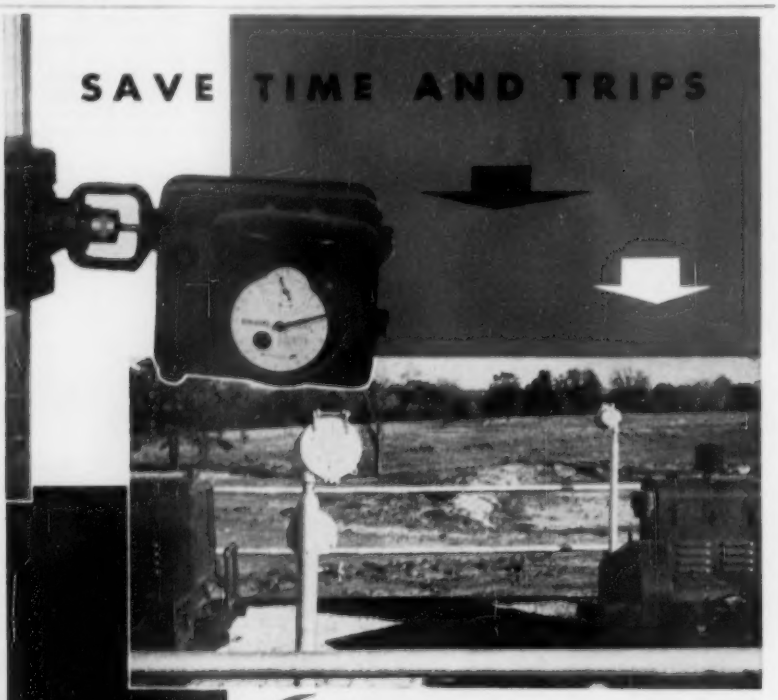
Initial drill-stem test of the Fusselman section of the Silurian, at 9,510-9,605 ft., had gas in 30 minutes, water blanket in 70 and oil in 90 minutes. After cleaning into pits for 35 minutes, it was turned into tanks and gaged 36 bbl. of 48.8° oil in 30 minutes. Gas-oil ratio was 708:1. Bottom-hole flowing pressure ranged from 738-2,710 psi., and 20-minute shut-in pressure read 4,480 psi. Sample top on the Fusselman was 9,583 ft., or minus 6,968 ft. Drilling continued after the test.

Gaines County extension . . . Quintana Petroleum Corp. 1 Butler, ½ mile northeast outpost to Glasco-Devonian field, flowed oil at the rate of 1,900 bbl. daily on a 30-minute test on perforations at 12,614-34 ft. The flow was through ⅜-in. choke, under pressure of 460 psi.

Martin discovery coring . . . Pan American Production Co. 1 Shook, Devonian discovery 15 miles southwest of Lamesa, had cored additional oil shows to 12,116 ft. The well last week flowed at the rate of 3,600 bbl. of oil a day on test in top of the Devonian at 12,081-98 ft.

Kent County strike . . . A Pennsylvanian reef strike was in the process of completion after making heavy oil flows on drill-stem tests. General Crude Oil Co. 24-1 O'Keefe, 12 miles northeast of Salt Creek field, flowed 105 bbl. of oil in 25 hours through ¼-in. choke, from pay at 6,592-6,606 ft. Top of the Pennsylvanian was picked at 6,585 ft. Earlier reports credited the well with flowing 50 bbl. an hour while on drill-stem test.

Phillips' discovery in central Howard County flowed 72 bbl. of oil an hour from the Fusselman.



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HUGOTON EMBAYMENT

TEXAS PANHANDLE

Morrow Confirmation Gas Well Gaged In Ochiltree

The 1-mile south extension and confirmation well to The Texas Co. 1 Barlow in Ochiltree County has been gaged. The 1 Ethel K. Cutter "A," Section 920, Block 43, H&TC Survey, flowed 28 M.c.f. of gas per day and 5 bbl. of distillate per million cubic feet of gas per day from perforations in the Morrow sand at 7,947-86 ft.

Deep Test Slated for Carson County Area

A 6,000-ft. test is slated for the area 2½ miles northwest of Skellytown in the old Panhandle field.

The deep test is Cabot Carbon Co. 50 R. C. Ware et al, Section 105, Block 4, I&GN Survey. The main field itself produces from the 3,000 ft. level.

Dallam County . . . About 27 miles north of Dalhart in a rank untested area D. D. Harrington will drill a 6,000-ft. wildcat, the 1 W. R. Hankla "A."

This well is located in Section 30, Block 18, Capitol Syndicate Subdivision.

Sherman County . . . Robert P. Fuller 1 Richardson will be a new wildcat in the northwestern part of this county.

The well, 5 miles northwest of Stratford, is in Section 125, Block 1-T, T&NO Survey, 6 miles northwest of West Panhandle field. It will go to 5,000 ft.

OKLAHOMA PANHANDLE

Beaver County Morrow Strike Is Completed

Completion of an important trend wildcat in southeastern Beaver County was reported last week by Colorado Oil & Gas Co.

The 1-3 Armstrong, C SW SW 3-2n-27eCM, 1 mile north of the town of Madison, Okla., and 16 miles southeast of nearest production at Southwest Camp Creek field, flowed 10 bbl. of oil and 23 of salt water per day. Perforations were at 7,688-7,706 ft. in the lower Morrow sand.

SOUTHWEST KANSAS

Kinderhook Discovery Is New Kiowa County Pool

A new Mississippian-Kinderhook oil pool has been opened in the prolific Kiowa County area on the northeast side of the embayment. The discovery well is Walt Kuhn & Innes 1 Bergner, SW SW 17-28s-16w.

The well, located 5 miles northwest of Pyle field, was completed flowing 489 bbl. of oil per day with gas volume gaged at 5,000 M.c.f. per day. Other production in the Mississippian was indicated on drill-stem test at 4,737-64 ft.

The second well in the area, the 2 Bergner, NW NW NW 20-28s-16w, was completed in the Kinderhook at 4,757-60 ft. for 336 bbl. of oil per day.

Other Kiowa events . . . Gramehart-Miller 1 Betzer, 2 miles northeast of Belvidere and 2 miles southwest of Soldier Creek field, is another Mississippian discovery in Kiowa County.

This well pumped 114 bbl. per day on potential. It is in the C NE 34-29s-16w.

ARK-LA-TEX

EAST TEXAS

First Heavy Producer Indicated at Bethany Field

A small oil-producing sector of the big Bethany gas field in the southeastern tip of Harrison County got its first heavy oiler.

The prospect is Linward Shivers 1 Ella Bergson, located 2½ miles northwest of the town of Bethany, in Jacob Womack Survey. At this report com-

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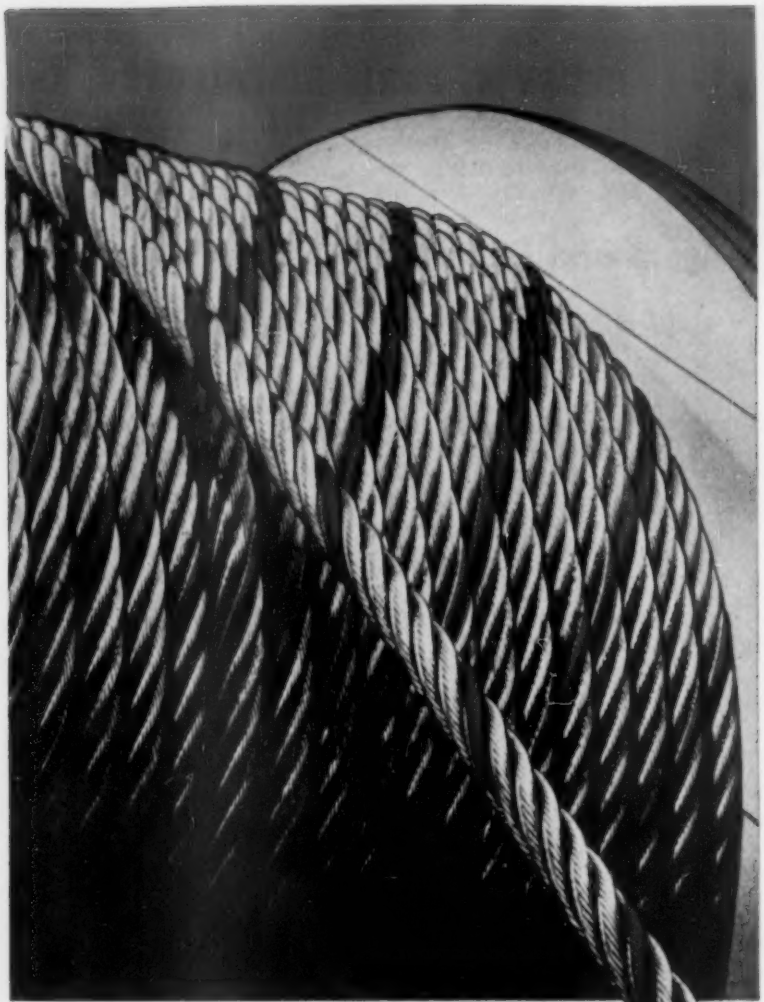

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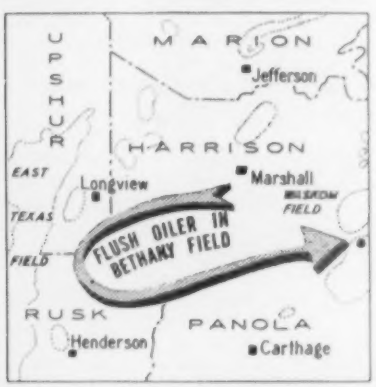
pletion had not been made, but operators said the well had flowed at the rate of 500 bbl. of oil a day through 12/64-in. choke. Pay was an open-hole section in the Fredericksburg limestone (Lower Cretaceous) at 2,420-32 ft. Oil was 35°, and tubing pressure was 650 psi.

New pay and second oiler . . . A new and deeper pay section in the Travis Peak was in prospect at what will be the second oil producer in the Blocker gas field of east-central Harrison County.

Maxwell Herring Drilling Corp. 1 William Whaley Unit was waiting on cement after running pipe to bottom at 6,475 ft. The prospective pay zone is the Travis Peak at 6,571-6,676 ft. A 1-hour drill-stem test of the interval, using ¼-in. top and bottom chokes, recovered 480 ft. of oil-cut mud. Shut-in pressure reached 3,030 psi. Previous to the test, a core from 6,625-76 ft. recovered 51 ft., of which 6 ft. was coarse sand, bleeding oil. A later test at 6,695-6,745 ft. developed salt water with no shows.



In an area where potentials range from 20-80 bbl. a day, Linward Shivers 1 Bergson was reported capable of making over 500 bbl. of oil a day.

The field's first oil well was La Gloria Corp. 1 Richardson. Potential was 104.82 bbl. of 41.5° oil from the Richardson sand of the Travis Peak, plus 14,000 M.c.f. of gas from the Page zone of the Pettit at 6,369-80 ft. No. 1 William Whaley had the Pettit at 6,226 ft. and the Travis Peak at 6,525 ft. on ground elevation of 315 ft.

MID-CONTINENT

KANSAS

Simpson Oil Discovery Reported in Harper County

Harper County has a new oil pool in the making. The discovery well is Aurora Gasoline 1 Miller in SE SE NE

11-33s-8w, 3 miles southwest of Berg field and 6 miles southeast of Attica, Kans.

Recovery on a drill-stem test in the Simpson at 4,893-4,901 ft. was 2,610 ft. of oil in the pipe. A test at 4,900-11 ft. flowed oil in 16 minutes. Operator is coring.

New Stafford pool . . . Homer Wilcox, Jr. opened a new pool at 1 Blount in SE SE SE 26-24s-15w, 1 mile northeast of Farmington pool.

The operator swabbed 11 bbl. of oil per hour. Top of the Arbuckle was 4,416 ft. The well was cleaned out to 4,428 ft., total depth, and a fill up of 1,600 ft. of oil was reported.

Promising Lansing Lime Discovery for Graham

A new Lansing lime oil pool has been opened in Graham County, 4 miles southeast of Custer pool. The discovery well belongs to Empire Drilling Co. and National Cooperative Refinery Association.

The 1 Dinkle, NW NW SW 15-10s-25w, is below 4,155 ft. The operator took four tests of the Lansing. All had good oil returns. The test at 3,740-95 ft. made 735 ft. of heavy oil-cut mud, 330 ft. of mud-cut oil, and 1,560 ft. of oil. A test at 3,788-3,815 ft. recovered 2,015 ft. of very gassy oil and 180 ft. of oil-cut mud.

ROCKY MOUNTAIN

Chadron Arch Program Starting

Calvert Drilling Co. Cyclone Drilling Co., and Kerian Oil Development have made locations for a series of wildcats in Box Butte and Morrill counties on the Chadron arch. Calvert has location for three wells in Box Butte County, and with Kerian Oil Development has made a fourth location in Morrill County. Cyclone Drilling Co. made a single location in Box Butte County. The series of wildcats extended along an axis of about 30 miles in length between Alliance and Hemingford.

There has been little previous drilling on this particular section of the Chadron arch, with no shows reported in the work which has been done before.

NEBRASKA

Discoveries Completed In Cheyenne, Kimball Counties

Shell Oil completed 1 Whitney, C SE NW 19-13n-52w, Cheyenne County for a flow of 3,500 M.c.f. of gas per day. Production is from "J" sand. The well, 4 miles southeast of Southwest Potter field, has been shut in. Also in Cheyenne County, British-American Oil Producing Co. has completed 1 Sahs, W½ NW NE 20-17n-50w for a pump gage of 301 bbl. of oil per day. Production is from "D" sand perforations at 4,752-56 ft. The well is 2 miles northwest of Pelster field production. The operator is already near total depth with an intended confirmation.

In Kimball County, Chandler-Musgrove, Inc., and Holly Development Co. have completed 1 Steele, C NW NW 23-15n-54w for 158 bbl. of oil per day. Production is from perforations 5,811-13 ft. Location is 2 miles southwest of nearest production.

WYOMING

North Casper Creek Test Flows Oil

Quality Oil Co. and Bruce Anderson, both of Casper had a flow of oil at the rate of 42 bbl. per hour on 79-minute drill-stem test of Tensleep at 1 Government, SE NE NW 1-36n-82w, in the North Casper Creek area of Natrona County. Test was of the interval 3,224-42 ft. There was no water reported in the recovery. The well is ¼-mile north of a Tensleep discovery

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drilled in 1952 and later abandoned due to recovery of a high percentage of water. At the new well the operators are coring below 3,242 ft.

New Gas Zone Tested At Hogsback Wildcat

General Petroleum Corp. recovered gas at the rate of 2,900,000 cu. ft. per day on test of the interval 6,910-7,113 ft. at 87-19 Hogsback Unit, Sublette County. Test was in Second Frontier. The well was previously tested for a flow of 3,075,000 cu. ft. per day at 6,461-6,593 ft. The unit was approved earlier this year. The well is 3 miles east of LaBarge field.

Discovery North of Sage Springs Creek Tested

Amerada Petroleum Corp. recovered 5,471 ft. of oil in 2-hour test of 36 Unit, C NW NE 12-37n-78w, 2 miles north of production in the Sage Springs Creek Unit, Natrona County. While tops are not reported, the test at 6,555-71 ft. is believed of Dakota. Flowing pressure was 1,000 psi. at the end of the test. The operator is running logs.

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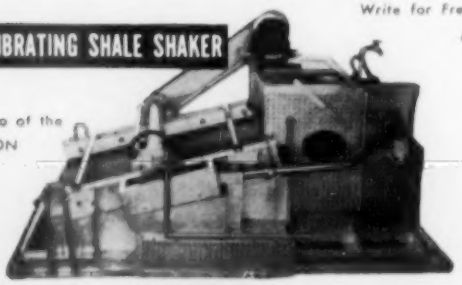

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Horse Ranch Discovery Completed

Amerada Petroleum Corp. pumped 75 bbl. of oil per day at its Tensleep discovery in the Horse Ranch unit, Natrona County. The well is 1 Unit, NW NW NW 4-36n-81w. Production is from the interval 5,160-65 ft. Location is 2 miles east of North Casper field. Amerada is drilling at an intended confirmation on the unit.

Horse Ranch Confirmation Finds Tensleep Oil

Amerada Petroleum Corp. recovered 482 ft. of free oil on test of 2 Unit, NW SE NE 5-36n-81w, on the Horse Ranch Unit, Natrona County. The well is an intended confirmation of this operator's recent Tensleep discovery on the unit. The discovery was completed pumping 46 bbl. of oil and 190 bbl. of water per day.

MONTANA

Bredette Area Confirmation Apparently Successful

Sinclair Oil & Gas Co. recovered oil on two drill-stem tests of the second well in the Bredette field, Roosevelt County. Test at 6,503-20 ft. in 1 Miller, C SW NE 13-32n-49e, recovered 3,300 ft. of oil and 60 ft. of sulfur water. The first test was open 1½ hours, the second only 1 hour. Flowing pressure reached 2,500 psi. at the end of each of these tests. The well is a northwest offset to the discovery, 1 Grimm, C NE SE 13-32n-49e. It was completed for a flow of 140 bbl. of oil per day through ⅛-in. choke. Both recoveries were from Madison. Sinclair is now running casing.

COLORADO

New Pays Found at Two Colorado Pools

Delfern Oil Co. has completed 2 UPRR-Peavy, C NE NE 19-12n-55w, in Logan County as a new pay discovery with production from "J" sand. The well flowed 100 bbl. of oil per day.

The "J" sand was topped at 6,159 ft. The well was intended as a confirmation to the "D" sand discovery, 1 UPRR-Peavy C SE SE 19-12n-55w.

In Morgan County, Delta Drilling Co. and Arrowhead Exploration Co. landed pipe at 5,280 ft., total depth at the intended West Messex confirmation. This well also has found apparent production from "J" sand while attempting confirmation of a "D" sand discovery. Recovered from 5,165-85 ft. was 1,300 ft. of oil with 1,130 ft. of water. The

discovery well produced 121 bbl. of oil per day from "D" sand.

Larimer County Wildcat Tests Oil Show

McElroy Ranch Co. recovered 150 ft. of oil and 120 ft. of heavily oil and gas-cut mud on drill-stem test at 4,869-83 ft. in Timpas at 1 Bunker, C SE SW 29-5n-68w, in Larimer County. Tool was open for 3 hours, and flowing pressure reached 200 psi.

Previous shows have been reported in this well. At last report the operator was running drill-stem test from 4,883-4,903 ft. The well is 1 mile northeast of Loveland field. Previous drilling in the area has been rather definitely confined to the immediate Loveland field vicinity.

Oil Show Reported In Saguache County

Majestic Petroleum Co., Denver, has reported recovery of small amounts of oil from a probe hole being drilled for uranium exploration in northern Saguache County on Colorado's western slope. The operators found oil in Mancos shale at depths of 80 to 500 ft. in the hole, in NE NE 21-48n-4e. A cable rig is moving in for a full scale test of the prospect. Majestic reported recovery of oil with water returns from drilling. There is no previous oil production in the area. Mancos shale production is known in several Colorado areas, with per well production usually small, but with the reservoir usually close to the surface.

GULF COAST

SOUTH LOUISIANA

New Deep Sand Uncovered In Bay St. Elaine Field

A new, deep gas-condensate sand is being opened at Bay St. Elaine, in coastal Terrebonne Parish. Its discovery well, 1-T LL&E,, flowed at the rate of 113 bbl. of 57.2°-gravity condensate and 4,008,000 cu. ft. of gas per day on tests through 3/16-in. choke. Pressure gaged 3,750 ft. Pay interval is 11,514-30 ft. Hole was drilled to 14,650 ft.

Oil Production Opened In Fayette Spur Extension

Texas Gulf Producing Co. has a new oil-discovery well in the Fayette Spur area, southeastern Beauregard Parish. The discovery extends the productive area 2,800 ft. southeast, and opens a new sand 550 ft. deeper than the gas-condensate zone from which the area's two previously completed wells, drilled by Magnolia Petroleum Co., are productive.

The new discovery well, 1-A Long Bell, flowed at the rate of 150 bbl. of 50°-gravity oil per day through 5/32-in. choke with pressure of 1,600 psi. and gas-oil ratio of 2,000 cu. ft. per barrel. Its pay is perforated at 9,366-71 ft. Total depth is 9,470 ft. Magnolia's two wells are productive from an 8,800-ft. sand.

Spot location of Texas Gulf's well is in the NE NE 16-6s-8w. Magnolia's nearest well, 2-H Long Bell, 2,800 ft. northwest, is in the SE SW 9-6s-8w. It confirmed the field's discovery by Magnolia's 1-G, a mile north.

Bayou Penchant Wildcat Indicates New Gas Area

Humble Oil & Refining Co.'s deep wildcat test 1½ miles southeast of the Bayou Penchant area, in the coastal marshes of Terrebonne Parish, appears to have discovered a new gas-condensate reservoir.

The well was drilled to 14,669 ft., and has production string of pipe cemented at 13,780 ft. Pipe was perfo-

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rated opposite a sand interval at 13,012-18 ft., where a drill-stem test showed gas and recovered 500 ft. of gas-cut mud with the water cushion.

Although no gage or estimate of productivity was made, and perforations have been squeezed, the well is called complete, being classified as a "potential gas well." It is standing shut in pending further development in the area and provision of an outlet.

EASTERN INTERIOR

ILLINOIS

Four New Oil Fields In Illinois in September

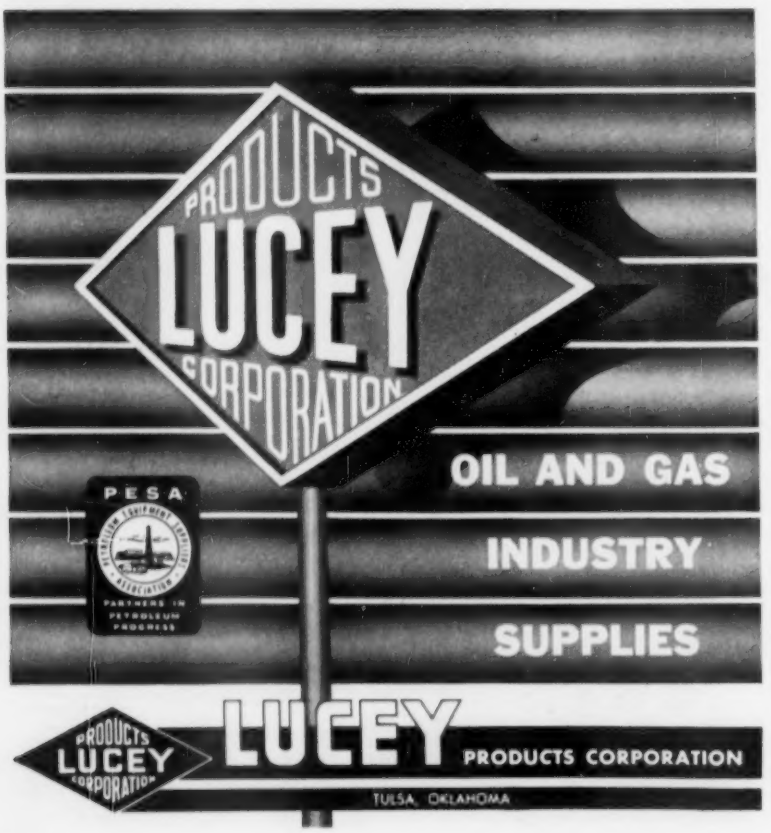
Four new oil fields, three of them in Saline County, were discovered in Illinois in September, according to the State Geological Survey Division of the Department of Registration and Education. The new pools are Eldorado West, Harco East, and Long Branch South in Saline County, and Stubblefield South in Bond County.

Production and drilling continued at a high rate during September. Daily average production was about 238,000 bbl., as compared with 175,000 bbl. per day in September 1954. Estimated production for the month is 7,150,000 bbl. If the present rate of production and price continues, Illinois will produce about $40,000,000 worth of oil more in 1955 than in 1954.

Drilling, which dropped off slightly in August, increased again in September. A total of 351 wells were completed during the month, an average of 88 per week, or 12.5 per day.

Interest in Saline County remains high. The Eldorado Consolidated pool appears to be almost completely developed, and a considerable amount of wildcatting is being done in an effort to find another similar pool. Of the 19 new pools discovered since January 1, 6 are in Saline County, all of them discovered in the past 3 months, and 3 of them in September. At the end of the month Saline had more wildcat wells drilling than any other county. Williamson County, to the west of Saline, was second.

Extensions to seven pools were discovered in September: Cook Mills and Mattoon in Coles County, Johnsonville West in Wayne County, Oak Point in Clark County, Bone Gap Consolidated in Edwards County, Beaver Creek South in Clinton County, and Omaha East in Gallatin County. New pays for the month were the Aux Vases sandstone in the Oak Point pool and the McClosky limestone in the Cook Mills pool.



APPALACHIAN

OHIO

Natol Corp. has apparently opened a new pool in Clark Township, Coshocton County. Although only 1¼ miles north of Bethlehem pool, it is separated from it by dry holes. The discovery on 1 P. K. Williamson, Section 24, reached 3,445 ft. and made 240 bbl. in 24 hours from the Clinton sand after fracturing. In the west end of the Layland pool, same township, the Natol 3 Lillian Brinker, Lot 38, logged the Clinton at 3,511-33 ft. with a fair showing natural, and 200 bbl. in 24 hours after treatment.

• An additional well in Flint Ridge pool was completed by Oil Development on 2 (7) B. F. Hoskinson, Section 11. Clinton at 3,247-90 ft. made 80 bbl. with 325,000 cu. ft. gas after fracturing.

PENNSYLVANIA

In Young Township, Indiana County, Southwest Pennsylvania, Manufacturers Light & Heat Co., has started moving in at 4836 G. L. Stewart and R. & P. Coal Co., wildcat, elevation 1,212 ft., Elders Ridge Quadrangle, .98 mile south of latitude 40 degrees 35 minutes and 2.35 miles west of longitude 79 degrees 15 minutes. This well is on the Jacksonville anticline and will be drilled to the Oriskany sand.

WEST VIRGINIA

Valley district, Barbour County, West Virginia Cumberland & Allegheny Gas Co. 522 Yocum-King, wildcat, elevation 1,900 ft., was drilled through the shale and resulted in a dry hole, 4,093 ft.

• In Roaring Creek district, Randolph County, this company's 523 Yocum-King, elevation 2,019 ft., was also dry through the shale, TD 4,058 ft.

EASTERN KENTUCKY

In Big Sandy gas field and located in the Pike County sector, United Carbon Co. has completed 36 Republic Steel Corp. for 684,000 cu. ft. of gas daily from Mississippian Maxon sand. Producing formation was topped at 1,814 ft. with pay ranging from 1,916 to 1,937 ft. Well was completed natural at a total depth of 1,945 ft. and a rock pressure of 485 psi.

GREAT LAKES

MICHIGAN

Deepened another foot in Traverse pay objective, Klondike Petroleum Corp., Inc. 1 Hoge, NE SE SE 5-14n-

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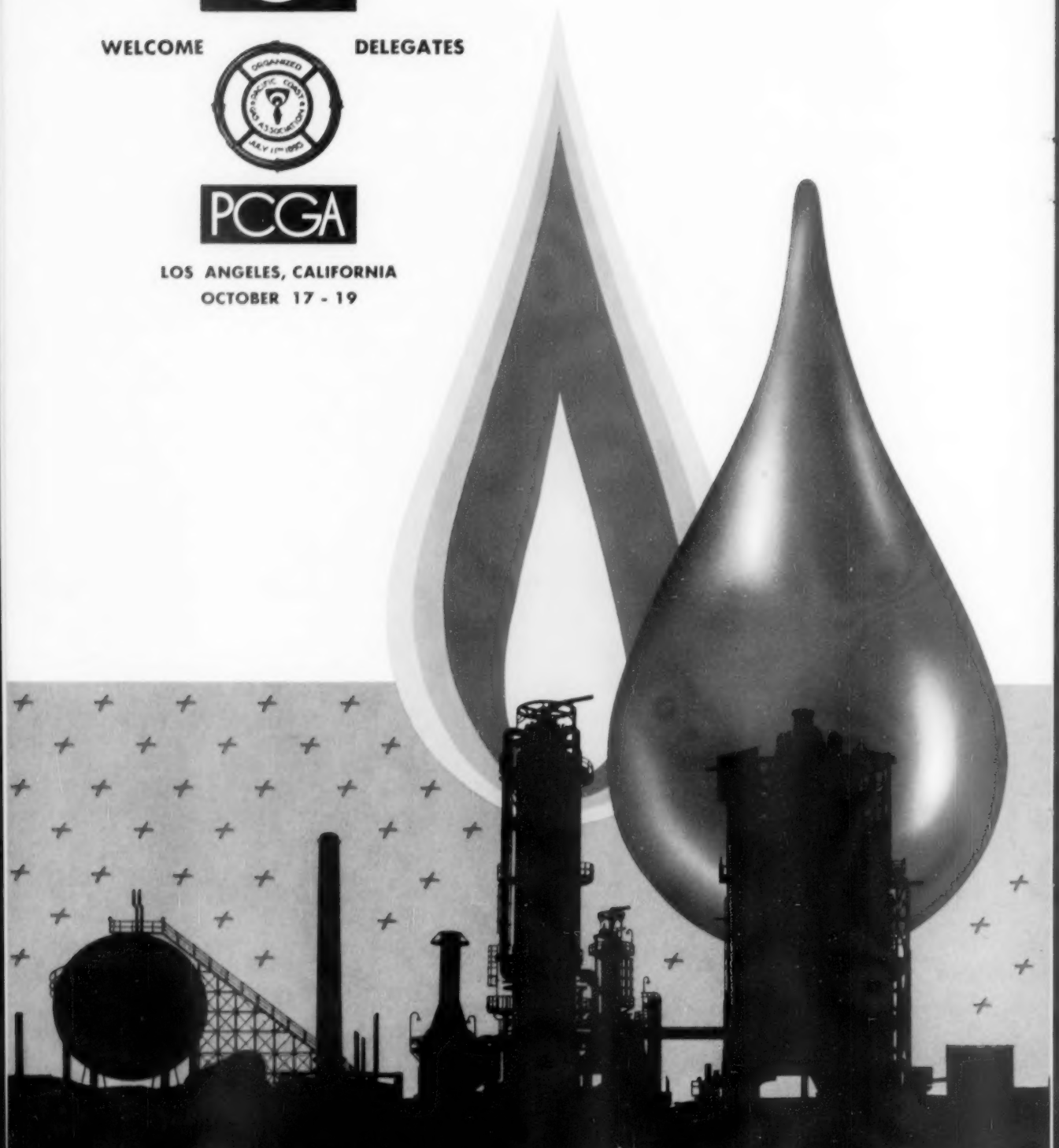

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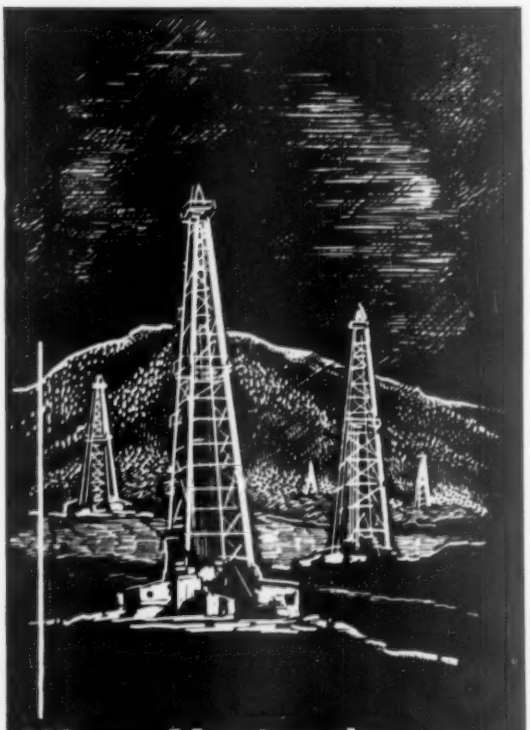

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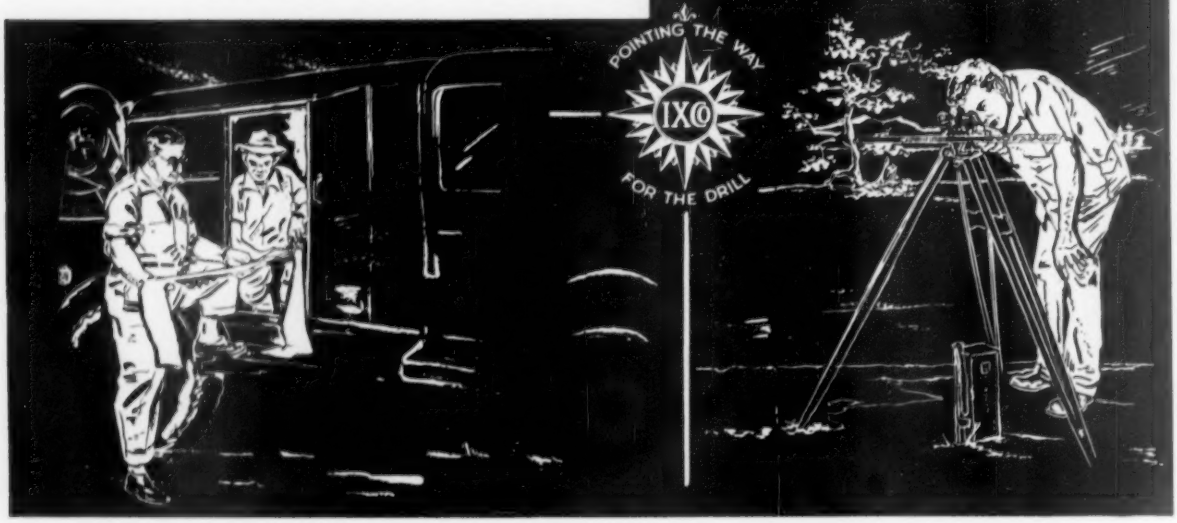

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14w, Denver Township wildcat, Newaygo County, swabbed and flowed by heads at a rate between 30 and 40 bbl. of oil a day through 5-in. casing. Wildcat has been shut down for several weeks at 2,110 ft., with some free oil showing, while title curative work on leases in drilling block was completed.

Successful Wildcats

ALBERTA

Western 10-11 Turin, LSD 11, 10-11-19w4. Basal Blairmore gas well. TD 3,596 ft.

Gulf 16 Herford (formerly Homestead 1 Foreman), LSD 16, 23-40-17w4. Viking gas well. TD 3,320 ft.

CALIFORNIA

Butte County: Humble Oil & Refining Co. B-1, SE SE 16-20n-1w, IPF 4,060 M.c.f., ¼-in. choke, 1,280 psi. tubing pressure, perfs. 3,365-90 ft., TD 4,370 ft. (New field discovery, Perkins Lake, 3 miles north of Llano Seco field.)

Sacramento County: Brazos Oil & Gas Co. 4 Tyler Island Farms, NW SE 5-3n-4e, IPF 1,350 M.c.f. daily, ¼-in. choke, 1,350 psi. tubing pressure, perfs. 3,713-19 ft. and 3,739-55 ft., TD 4,634 ft. (Southerly extension well to River Island field.)

NORTH LOUISIANA

Catahoula Parish: Discovery of Guthrie Lake field. Trans-Tex Drilling Co. 1 L. S. Stutson, 4 miles west of Northwest Sicily Island field and 1½ miles northeast of Harrisonburg in 7-9n-7e. IPF 62 BOPD, Wilcox 4,200-05 ft., 41.5°, 5/64-in. choke, TD 8,437 ft. (Oil discovery.)

Concordia Parish: Discovery of Quinn Bayou field. Jett Drilling Co., Inc. C-2 Madison Oil & Development Co., 5 miles southeast of Monterey, 1¾ miles northeast of North Cocodrie Bayou field in NW SE 16-5n-8e. IPF at rate of 165 BOPD, Wilcox 4,812-13 ft., 39.9°, 10/64-in. choke, TD 7,121 ft. (Oil discovery.)

Franklin Parish: Extension discovery at Lamar field. E. M. Carpenter et al 1 C. E. Wright, 12-15n-8e. IPF 171 BOPD, Paluxy 5,030-33 ft., 44.6°, ¼-in. choke, TD 5,138 ft.

SOUTH LOUISIANA

Lafourche Parish: California Co. 5 City of New Orleans, 20-23s-23e. IP 234 BOPD, 9/64-in., 25.2°, perforations 8,614-32 ft., TD 8,981 ft. (New field—North Bay Marchand Block 2.)

Plaquemines Parish: Continental Oil Co. 1-A State Lease 2549, Block 55, West Delta area, Gulf of Mexico. IP 1,870 M.c.f. daily, 7/32-in., dry gas, perforations 4,844-52 ft., TD 14,030 ft. (New offshore field.)

Terrebonne Parish: Gulf Refining Co. 3-B O.C.S. Lease 0420, Block 154, Ship Shoal area, Gulf of Mexico. IP 204 BOPD, 9/64-in., 29.8°, perforations 6,525-40 ft., TD 8,565 ft. (New pay in Ship Shoal Block 154 field.)

NEBRASKA

Cheyenne County: British-American Oil Producing Co. 1 Sahs, W½ NW NE 20-17n-50w, IPP 301 BOPD, "D" sand discovery, new field. TD 4,981 ft. "J" sand.

Shell Oil Co. 1 G. Whitney, C SE NW 19-13n-52w. IP 3,500 M.c.f. of gas per day, "J" sand gas discovery, new field. TD 5,661 ft. "J" sand.

Kimball County: Chandler-Musgrove; Holly Dev. 1 Steele, C NW NW 23-15n-54w. IPP 158 BOPD, "J" sand discovery, new field. TD 5,882 ft. Skull Creek.

OKLAHOMA

Beaver County: Colorado Oil & Gas Co. 1-3 Armstrong, C SW SW 3-2n-27eCM. IPF 10 BOPD, 1,629 M.c.f. of gas per day, Morrow sand 7,688-7,706 ft., 49°, ⅜-in. choke, TD 7,900 ft. (Gas-distillate discovery.)

Grant County: Woods Petroleum Corp. 1 Conrady, 7 miles east of Northwest Round Hill field in C SE SE 13-28n-7w. IPF 932 BOPD, Bartlesville sand 4,906-10 ft., 38°, 30/64-in. tubing choke, TD 5,051 ft. (Oil discovery.)

SASKATCHEWAN

Imperial 3-9 Ingoldsby, LSD 3, 9-4-31w1. Mission Canyon oil well. TD 3,990 ft.

Imperial 15-7 Ingoldsby, LSD 15, 7-4-31w1. Mission Canyon oil well. TD 3,774 ft.

WEST TEXAS

Crockett County: Superior Oil Co. 1-22 Shannon, 22-BB-EL&RR Sur., 18 miles SW Big Lake. IPP 75 BOPD, 40.8°, GOR 726, pay 8,040-55 ft. TD 9,898 ft.

Ector County: Stanolind Oil & Gas Co. 1-B Edwards, 17-43-T3S-T&P, 7 miles SW Odessa. IPP 104 BOPD, 28.5°, GOR 204, pay 4,284 ft. TD 4,385 ft.

Midland County: Roy Furr 1-G Driver, twin well to Spraberry well, and San Andres pay discovery. IPP 104.4 BOPD, 30°, GOR zero, pay 3,800 ft. TD 3,820 ft.

Reagan County: The Texas Co. 1 Dixon, Andrew Roach Sur., A-4875, 8 miles NW Texon. IPP 66 BOPD, GOR 1445, 40.7°, pay 7,846 ft., TD 12,229 ft.

Tom Green County: Stanolind Oil & Gas Co. 3-A Johnson, A. D. Neill Sur., 6 miles NE Christoval. IP 210.8 BOPD, 14/64-in., TP 450, GOR 343, 30.8°. Strawn sand 5,032-92 ft. TD 6,128 ft.

NORTH TEXAS

Grayson County: Wm. D. McBee 1 Robertson, W. H. Crow Sur., A-1539, 6 miles NW Sherman, 1 mile NW production. IP 310 BOPD, 13/64-in., TP 1050 psi., 35°, GOR 925, Davis sand 9,430-38 ft. TD 9,857 ft.

Orm Drilling Co. 1 Willis, W. A. Warner Sur., A-1353, 4 miles NW Sherman, 1½ miles W. O'Hagan field. IPP 169 BOPD, 24.8°, GOR 120, Pennsylvanian sand 8,440-61 ft. TD 8,751 ft.

Jack County: Bobby M. Burns 1-B Scott, J. B. Atkinson Sur., A-1, 1½ miles E. Poast Oak. IPP 34.8° BOPD, 41°, GOR 450, pay 3,942 ft. TD 4,034 ft.

Wise County: Christie, Mitchell & Mitchell 3-C Caswell, Sec. 6, Blk. 3, Cooke CSL, 2 miles SW Alvord. Dual completion, previously completed from conglomerate at 5,699-5,722 ft. IP from Caddo conglomerate at 5,457-67 ft. 195.7 BOPD, 14/64-in., CP 250 psi., GOR 946, TD 5,940 ft.

Young County: Anderson Oil Co. 1 Coleman Wells, TE&L Sur. 731, A-736, 6 miles SW Newcastle. IP 184 BOPD, ⅛-in., TP 500 psi., 43°, GOR 800, Mississippian 4,518 ft. TD 4,532 ft.

H. Curtis Plumly Jr. 1 Daws, TE&L Sur. 768, A-773, 14 miles W. Newcastle. IP 112 BOPD, ½-in., TP 80 psi., 42°, GOR 258, Strawn 4,565-70 ft. TD 4,875 ft.

WEST CENTRAL TEXAS

Stephens County: P. W. Pitzer 1 Pitzer, 15-4-T&P, 6 miles NE Caddo. IP 75 BOPD, ½-in., GOR 300, TP 450 psi., 41°, Strawn sand 1,998 ft. TD 2,003 ft.

TEXAS PANHANDLE

Ochiltree County: The Texas Co. 1 Barlow, C N½ NE SW Blk. 43, Sec. 929, H&TC Sur. IPF 1 BD per million, 1,563 M.c.f. of gas per day, 7,962-81 ft. TD 8,700 ft. (Gas-distillate discovery.)

SOUTHWEST TEXAS

Duval County: The Texas Co. 1-B DCRC NCT 32, Norman Collins Sur. 203, A-918 (6 miles north of Freer), IPP 63.50 BOPD (net), 25 per cent water, 20.3°, perforations 2,048-56 ft. TD 3,005 ft. (New field—Petrex.)

Jim Wells County: J. M. Dellinger 4 Fee, Sec. 19, Richard King Farm Lots (6 miles northwest of Agua Dulce). IP 44.16 BOPD, 9/64-in., 39.9°, perforations 5,233-39 ft. TD 5,279 ft.

Webb County: Skelly Oil Co. 2-C Martin, C&M Sur. 476, A-3162, Certificate 292. IP 43 BOPD (net), 65 per cent water, ⅝-in., 36.6°, perforations 6,480-88 ft. TD 6,552 ft. (New pay in Aguilares field.)

Zavala County: Pronto Drilling Co. and M. E. Andrews 2 West, AB&M Sur. 87, A-33. IPP 13,000 M.c.f. daily, open-flow potential, Olmos sand 4,230-70 ft. (perforations). TD 4,340 ft. (Revives and extends Leona River gas area.)

TEXAS GULF COAST

San Patricio County: Ussery Drilling Co., et al 2 Blaschke-Mayo, Sec. 25, Taft Farm Lands (5 miles north of Taft). IP 183 BOPD, ¾-in., 42°, perforations 5,182½-86½ ft., and (dual completion) 124 BOPD, ¾-in., 35°, perforations 5,636-38 ft. TD 6,546 ft. (New pay in Plymouth field.)

Victoria County: Chicago Corp. 1 Ressman-Richey Land Co., Subd., Roseborough Ranch. IP 43,000 M.c.f. daily, open-flow potential, gas, perforations 6,415-17 ft., and (dual completion) 22,000 M.c.f. daily, open-flow potential, gas, perforations 6,325-60 ft. TD 6,893 ft. (New field.)

WYOMING

Natrona County, Pine Mountain: Midland Oil Co. 1 Government-Pine-Midland, SW SE NW 11-34n-84w. IP 6,000 M.c.f. of gas per day, Tensleep discovery. TD 1,416 ft. Tensleep.

LEGAL

SEALED BIDS will be received until 2:00 P. M., Mountain Standard Time, October 27, 1955, and opened at that time in the office of the Navajo Indian Agency, Window Rock, Arizona, for the leasing of approximately 30,409 acres of allotted land which represents 190 separate Indian Allotments located in San Juan County, New Mexico, also 2 tribal tracts in Navajo County, Arizona, totaling 2,560 acres and 10 tribal tracts in San Juan County, New Mexico, totaling 22,983 acres, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the General Superintendent of the Navajo Indian Agency, Attention: Branch of Realty, Window Rock, Arizona.

PERSONALS

Oil Man by Chance

Robertson hit on leases he got as pay for legal work

FRENCH M. ROBERTSON, new president of the Texas Mid-Continent Oil and Gas Association, backed into the oil business.

But the widely known Abilene, Tex., independent considers himself lucky it happened, for each has been good for the other.

French's father, John E. Robertson, was active early in such historic Texas oil fields as Burkburnett, Ranger, Breckenridge, Mexia, and Luling.

French, however, wanted to be a lawyer. He studied law at the universities of Texas and Oklahoma and was admitted to the bar in 1927. He was elected county attorney of Haskell County, Texas, and served two terms beginning in 1929.

Robertson's law practice was hit hard by the depression. Many times he accepted payment for his services in something other than money.

Oklahoma friends, for instance, offered him interests in leases and drilling ventures for examining and clearing titals.

His first three tries were dusters. The fourth, brought in West Novice field of Coleman County in West Central Texas. Robertson had a one-sixth interest in the well—which was put down with borrowed pipe.

This was the turning point. For several years after this strike, Robertson says, "I couldn't seem to miss."

His was a one-man operation. He usually stuck close by the well site. He slept either in his car or in a tent. He acted as his own land man, geologist, and production man.

Oil career interrupted . . . The energetic growth of Robertson's little oil empire was delayed temporarily by World War II. He entered the Air Force and received the Legion of Merit for his work as training director of the Warner-Robbins Area Command.

Returning to West Texas in 1946, he bought leases in several West Texas counties and completed his first postwar well in Sharon Ridge pool of Scurry County. He since has drilled more than 100 wells in that field and over 250 in West Texas as a whole.

A year ago this month he completed the Robertson Hydrocarbon plant, a natural-gasoline plant in the Goldsboro area of Runnels and Coleman counties.

Robertson still is very nearly a one-man oil firm. He was relieved of much administrative burdens recently, however, when a brother joined him.

Other talents . . . Despite his devotion to his business, Robertson some how finds time to do a variety of civic and industry activities.

He is chairman of the board of the Texas prison system and has been a member of the board for 9 years.

He resigned only last May after serving 4 years as Southwest regional administrator of the Federal Civil Defense Administration. He organized, staffed, and trained personnel for this agency. It is responsible for civil defense in Texas, Oklahoma, Louisiana, New Mexico, and Arkansas. He is personal adviser to the present administrator.

Robertson isn't a new name to Texas Mid-Continent either. He is a former regional vice president of the group, the oldest and largest oil and gas producer organization in Texas.

He currently is a director of the general Mid-Continent Oil and Gas Association, the American Petroleum Institute, and the Independent Petroleum Association of America.

He has served as president of the West Central Texas Oil and Gas Association, as vice president of the Texas Independent Producers and Royalty Owners Association and of the Texas Manufacturers Association, and on the engineering committee of the Interstate Oil Compact Commission.

He also is a former president of the Abilene Chamber of Commerce.

Harry E. Cier has been promoted to research specialist in the research and development division at Humble Oil & Refining Co.'s Baytown, Tex., refinery.

Gus G. Douglas has been promoted to area engineer by The Texas Co. and transferred from Healdton, Okla., to Winfield, Kans.

Moody B. Robinton, former dehydration plant foreman for United Gas Pipe Line Co. at Refugio, Tex., has been promoted to gasoline plant foreman at Arcadia, La.

Floyd R. Cramer has been named plant superintendent in the Texas pipeline division of Southern Counties Gas Co. Cramer, former assistant plant superintendent, succeeds **Glenn V. Vail,** who resigned to accept a position with Pacific Northwest Pipeline Corp.

W. McCOMMONS

William E. McCommons has resigned as vice president in charge of exploration, drilling, and production for Nortex Oil & Gas Corp. at Dallas to organize McCommons Oil Co. in that city. McCommons will be a partner in another newly organized firm, McCommons-Seale Drilling Co., along with **Russell (Doc) Seale,** who has resigned as drilling superintendent of South Texas Development Co. in Sterling, Colo. The new drilling company also will headquarter in Dallas. McCommons, before he joined Nortex, was general manager of operations for George S. Engle in Kentucky, Indiana, Illinois, Colorado, Louisiana, and Texas.

B. Bynum Turner, vice president in charge of research and engineering for Ethyl Corp., has been promoted to executive vice president, a new position in the company. Turner joined Ethyl in 1946 as assistant to the plant manager at Baton Rouge. He was named general manager of manufacturing in 1949 and elected a vice president in 1951.

Robert H. Aitken, former superintendent of The Texas Co.'s Eagle Point Works at Westville, N. J., has been named manager of the newly established refining division of the foreign operations department, covering the Western Hemisphere and West Africa. Aitken joined Texaco in 1926 as a draftsman-engineer at the firm's Lawrenceville, Ill., refinery. **Horace H. Chandler** has been named superintendent at Eagle Works to succeed Aitken. **W. R. Sorenson,** former assistant super-

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Fig. 2698—Globe, inside screw, 600 lb sp.

Fig. 2699—Angle, inside screw, 600 lb sp.

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EAST CHICAGO, INDIANA

PERSONALS

visor of the process division in New York, succeeds Chandler as assistant superintendent at Eagle Point.

H. E. HUGHES

Howard E. Hughes has been promoted to superintendent of Shell Chemical Corp.'s Houston plant. Hughes, who had been serving as assistant superintendent of the technical department, succeeds **Frank G. Watson,** who has been named assistant to the vice president of manufacturing in the firm's New York office. Hughes joined Shell Chemical as a tester at Martinez, Calif. He was named chief engineer at Dominguez, Calif., in 1944 and came to Houston in 1951.

George V. Atkinson, former superintendent at Shaw, Miss., for Trunkline Gas Co., has been promoted to safety engineer and transferred to the firm's home office in Houston.

W. E. Gillen, former district engineer with Texas Pacific Coal & Oil Co. at Lawn, Tex., has been promoted to field foreman and transferred to Sundown, Tex.

Leonard B. Jones, former office engineer with Continental Pipe Line Co. at Ponca City, Okla., has been named project engineer and transferred to Wheatland, Wyo.

Paul A. Demkovich has been appointed group leader in Standard Oil Co.'s (Ind.), Whiting, Ind., research laboratories. Demkovich joined Standard as a chemist in 1947.

C. D. (Dan) Brown has resigned as district geologist for Lion Oil Co. in Shreveport and will join the geological staff of Placid Oil Co. **Martin Allen,** presently with Lion at El Dorado, Ark., has been named acting district geologist at Shreveport.

M. S. Patton, Jr., has been named manager of the joint operations division of Sunray Mid-Continent Oil Co.'s production department. Patton succeeds **J. R. Vandever,** who recently was named head of the newly formed property acquisition department. Patton joined the firm in 1946 as district engineer at Big Spring, Tex. He was later named division engineer and then acting head of joint operations.

A. V. Hargis, former district geophysicist with Arkansas Fuel Oil Corp. at San Antonio, has been promoted to division exploration manager of the South Louisiana division. He will be headquartered at Lafayette.

F. O. Newton has been elected to the newly created postion of vice president of supply and distribution by Universal Oil Products Co. Newton joined Universal in 1934 and has been assistant to the executive vice president since 1952.

R. S. McFarland has been named president of Canadian Seaboard Oil Co., a newly formed subsidiary of Seaboard Oil Co. Other officers are **J. P. Gasser,** vice president; **M. E. Schwartz,** vice president; **M. E. Webb,** secretary; and **O. L. Hill,** treasurer.

John Wents, Jr., Los Angeles consulting engineer, has rejoined Tide Water Associated Oil Co. as assistant manager of the Mid-Continent division at Tulsa. He has previously been with Marland Oil Co. and Continental Oil Co.

R. D. Leisk has been named president of Sunshine Exploration, Ltd., a newly formed subsidiary of Sunshine Mining Co. **A. F. Wynn,** formerly with Amurex Oil Development Co., is general manager of the firm, which will operate out of Calgary.

Robert T. Drake, North Sample Log Service, has been elected president of the North Texas Geological Society. Other officers are **James M. Harmon,** W. M. Summers & Associates, vice president; **O. W. (Buzz) Fauntleroy,** R. Clay Underwood, secretary, and **Charles R. Haworth,** Superior Oil Co., treasurer.

Robert Kazarian, development engineer for Shell Oil Co., has been transferred from Long Beach to the company's area production office in Los Angeles. **John T. Billings, James R. Dozier, Lloyd G. Otteman** and **Harold E. Wood** were promoted from junior mechanical engineers to mechanical engineers. In addition to the promotions, Billings was transferred from Los Angeles to Ventura, Calif., Dozier from Los Angeles to Bakersfield, Calif., and Wood from Los Angeles to Long Beach. Other Shell promotions and transfers included **David M. Fradkin** from junior development engineer to development engineer while mechanical engineers **Walter D. Larrick** and **Hans C. Mol** traded locations. Larrick went from Ventura to Los Angeles while Mol moved from Los Angeles to Ventura.

B. W. Gwinn, former geologist with The California Co., has resigned to join Argo Oil Corp. in Denver as a geologist.

A. E. Harnsberger has been named general manager of transportation and supply by Pure Oil Co. He joined the firm in 1924 and since then has been primarily engaged with activities of the refining division. He was recently manager of the refinery technical department.

F. L. Johnson has been named director of production research and development for Sun Oil Co. to cap the

F. L. JOHNSON

P. E. CHANEY

company's reorganization of its research program and construction of new research facilities at Richardson, Tex., on the outskirts of Dallas. Johnson formerly was acting director of production research and development for Sun at Newtown Square, Pa. **Preston E. Chaney,** former manager of the Beaumont, Tex., production laboratory, has been appointed assistant director at Richardson under Johnson. **H. W. Perkins** has been promoted from assistant manager to manager of the Beaumont lab replacing Chaney. **R. J. Cordell,** formerly of Sun's Abilene laboratory, has been named acting manager of geological research at Richardson. **Morris Bock,** who was in charge of Sun's Southwest production lab at Dallas, has moved with his group to the new lab at Richardson, as has **I. B. Hamilton,** head of the geological service section. **B. M. Gottlieb,** formerly gas engineer at Philadelphia, has been moved to Richardson in charge of liaison between operations and research in reservoir mechanics and production technology. **Fred M. Mayes** will be moved from Newtown Square to Richardson in charge of well-logging and geophysics research. **J. W. Jones,** research engineer, also will be moved from Newtown Square to Richardson.

PERSONALS

Robert D. Sprague, former division geologist with Sinclair Oil & Gas Co. at Jackson, Miss., has been transferred to the offshore division at New Orleans.

William J. Scott has been promoted from assistant general production superintendent to general production superintendent of the Pacific Western Oil Corp. in Los Angeles.

A. H. Tomlinson, a director of Standard - Vacuum Oil Co. since the firm was formed in 1933, has retired. Tomlinson was responsible for Stanvac's refining operations which grew from one 28,000-bbl. refinery to six plants capable of charging 160,000 bbl. daily.

Robert A. Caskie has resigned as geologist for Olin Oil & Gas Corp.'s Arkansas district to join Williams Drilling Co., Inc., of Springhill, La. Caskie has been with Olin in El Dorado for 3 years and before that was a geologist with Lion Oil Co. for 3 years.

C. A. Houy, vice president in charge of exploration and production for Crescent Corp., has resigned to become president of Lee Evans Drilling Co., Tulsa. **H. R. Bolton,** manager of production, will succeed Houy as vice president.

Wayne Z. Burkhead has been elected vice president of TXL Oil Corp. Burkhead joined TXL in March of this year as chief geologist. Before going with TXL, Burkhead was chief geologist of the Gulf division of Union Oil Co. of California. He has also served with Stanolind Oil & Gas Co. and Superior Oil Co.

John R. Sherman has been promoted by Gulf Oil Corp. at Fort Worth from assistant division gas engineer to division gas engineer. He replaces **T. W. Rhoads,** who has retired and plans to become a consultant in the gas and gasoline field. **James W. Cole, Jr.,** moved up from gas-contract man to replace Sherman, who had served as assistant division gas engineer since 1950.

H. E. Swedburg, Lincoln, Neb., **Orin Angwall,** Marinette, Wis., and **John N. Backus,** Denver, have been elected to the board of Empire Petroleum Co., Denver, following merger of Western Empire Oil Co. into Empire Petroleum. **H. O. Batzer,** former president of Western Empire, has been elected chairman of Empire Petroleum, and **Hartley C. Gleason,** Casper, Wyo., has been named assistant vice president in charge of oil field operations.

Vic McCauley, geologist with Atlantic Refining Co., has been transferred from Durango, Colo., to Bismarck, N. D.

D. F. Wittenburg has been named chairman of the newly established Utah Oil and Gas Conservation Commission. Other commissioners are **T. S. Curtis** and **Herbert F. Smart. Lee E. Young** is secretary of the commission.

Edmund C. McCallum, who retired October 1 as leasehold and division order superintendent for the North Texas-New Mexico division of Stanolind Oil & Gas Co. at Fort Worth, has announced he will join Lyons, McCord & Logan, Shreveport independent.

J. T. Jamison has been promoted by Southern Minerals Corp. from manager of its Midland, Tex., office to vice president of the firm at Corpus Christi. **Jack Samples** has been named to succeed Jamison at Midland.

Roy Harris has resigned as West Texas-New Mexico division manager for Anderson-Prichard Oil Corp. at Midland, Tex., to open offices in that city as a consulting geologist.

David L. Garrison, president of Bel Oil Corp., Lake Charles, La., and **John T. Lochridge,** vice president of Fifteen Oil Co., Houston, have been elected to the board of directors of Mikton Oil Co.

John G. Richards, former reserves and valuation engineer with The Texas Co. at Fort Worth, has resigned to join the Fort Worth National Bank as a petroleum engineer in its oil-loan division. Richards joined Texaco in 1946 in Midland, Tex., and was transferred to Fort Worth in 1951.

Eugene E. Dawson, former head of the drilling department of International Petroleum Co., Ltd., at Talara, Peru, has been promoted to services superintendent there. Dawson joined International in 1952 and was promoted to head of the drilling department the same year. Other personnel changes by International are **G. V. Young,** assistant drilling department head, named to succeed Dawson; **S. D. Denny, Jr.,** head of the drilling engineering section of the petroleum engineering department, named to succeed Denny.

Roy Chambers, Jr., engineer with Standard Oil Co. of Texas, has been transferred from Cotulla, Tex., to the firm's offshore district at Corpus Christi.

J. G. Jackson, Jr., former petroleum engineer at Angleton, Tex., with Humble Oil & Refining Co., has left the firm to become a partner in Tucker, Jackson & Co., consulting petroleum engineers, of Houston.

M. L. Slusser, a member of Magnolia Petroleum Co.'s field-research lab staff at Dallas since June 1949, has been promoted to senior research chemical engineer. He has been assigned problems of formation damage and production stimulation in the drilling-mechanics and well-completion group of the production division.

R. S. Douglass has been appointed superintendent of Shell Oil Co.'s refinery at Norco, La. Douglass succeeds **L. T. Wilson,** who has been named manager of the Montreal refinery of Shell Oil Co. of Canada. For the past 9 years Douglass has been assistant manager of the manufacturing engineering department in Shell's New York office. Douglass joined Shell at its Wood River, Ill., refinery in 1927.

DEATHS

Fred E. Markey, 73, retired Michigan drilling contractor, died October 2 at his home in Stafford, Ohio.

Matthew Thomas (Tom) McGinley, 79, retired oil well driller and producer, died October 6 in a Tulsa hospital after a long illness. McGinley was active in the Okmulgee, Okla., area for years before moving to Tulsa around 1925.

J. A. Pipsaire, 67, a veteran of nearly 50 years in the oil industry, died in Longview, Tex., October 4. Pipsaire was a production superintendent for Sun Oil Co. in El Dorado, Ark., 21 years and was drilling and production manager for Edwin M. Jones Oil Co. at Longview for the next 24 years. He had operated as an independent for the past few years.

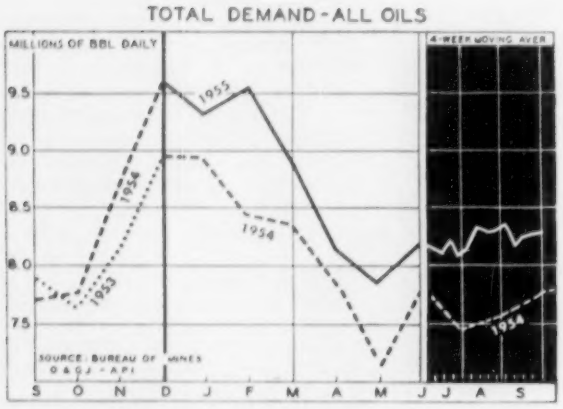
Harold Barton Stone, 65, retired marketing executive of Atlantic Refining Co., died October 2 after suffering a heart attack. Stone had served with Atlantic for 43 years at the time of his retirement last June.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,707,575	UP	56,575	UP	582,519
Crude stocks	254,798,000	UP	164,000	DOWN	15,286,000
Completions	1,110	DOWN	218	UP	20
Refinery runs*	7,462,000	UP	58,000	UP	483,000
Gasoline stocks*	151,266,000	DOWN	539,000	DOWN	852,000
Distillate stocks*	143,722,000	UP	908,000	UP	15,886,000
Residual stocks*	46,754,000	DOWN	178,000	DOWN	9,611,000
Four-product stocks*	378,155,000	UP	350,000	UP	3,446,000
Total imports*	1,280,100	UP	65,300	UP	425,200

*A.P.I. statistical reports for week ending October 7 not available due to Columbus Day holiday in New York City. Above A.P.I. information for week ended September 30.



Lube Market Improves But Prices Still Below Normal

WITH low inventories and a continued strong domestic demand, prices on most grades of lubricants are firm with advances in quotations when any changes are made.

Briefly summarized, domestic demands for the first 7 months of this year were 8.5 per cent greater than the same period last year and 2.9 per cent larger than the first 7 months of 1953. Exports the first 7 months of this year decreased 7.5 per cent but total demands were 4 per cent ahead of the same period last year. The export demand, according to sellers, has improved in recent weeks.

Total stocks of lubricants on July 31, according to the latest report of the Bureau of Mines, were 3.7 per cent less than the same date last year and 9.4 per cent less than on July 31, 1953.

These data reflect the fact that the statistical situation in lubricants has improved over the past 2 years, but as regards price the improvement still has some distance to go before there is a return to what is considered normal levels in quotations for the principal grades at refineries.

The lower price trends since 1948 are explained as due to important increases in manufacturing output and less than expected expansion in domestic demands with some loss in export markets to new refining facilities in other countries. It is now felt that a better balance in supply and demand will be reflected in a gradually healthier market situation.

In this connection it is pointed out that in the manufacture of the better grades of motor oils and industrial oils special processing is necessary. This fact, plus the use of additives, becomes the major determining factor in prices. In some of the multigrade W oils no bright stocks are used and cases are cited where the additives cost as much per gallon as do the conventionally refined base lubricants. The additives are used for oxidation, corrosion, detergency, pour point and viscosity index. Some of these oils have a V.I. as high as 135 in contrast to the usual 95.

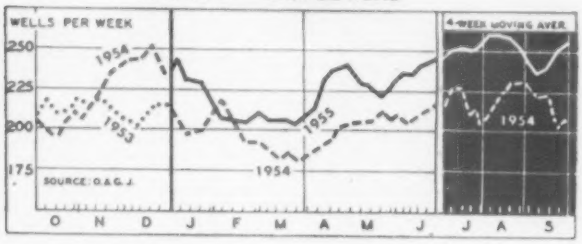
It is expected that these highly refined motor oils which retail up to 65 cents per quart will increase in production because of the requirements of the newer motor-vehicle engines. These oils reduce the carbon residue in cylinders, which is a factor in the higher octane requirements of motor fuels.

The following table was prepared to show the changes in the relative position of refinery areas in output of lubricants. The Gulf Coast of Texas and Louisiana with over 50 per cent of the production has greatly increased in importance in both domestic and exports markets in recent years.

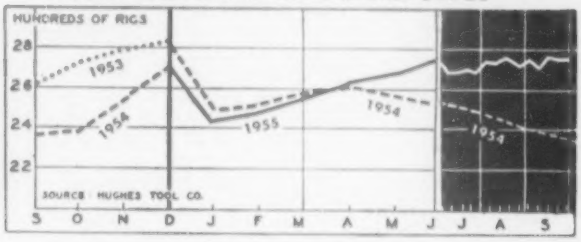
PRODUCTION OF LUBRICANTS BY DISTRICTS IN PERCENTAGE OF TOTAL UNITED STATES

	July 1955	1950	1938
East Coast	14.3	19.7	24.7
Appalachian	7.3	10.4	18.7
Ind., Ill., Ky., etc.	6.8	9.3	8.5
Okla., Kans., Mo., etc.	7.7	8.1	9.6
Texas Inland	0.3	0.1	0.7
Texas Gulf	40.1	32.1	24.7
Louisiana Gulf	11.3	8.7	3.5
Ark., La., Inland, etc.	3.3	3.1	1.5
New Mexico, other Rocky Mnt.	0.1	0.5	0.7
California	8.8	8.0	7.4
Total	100.0	100.0	100.0

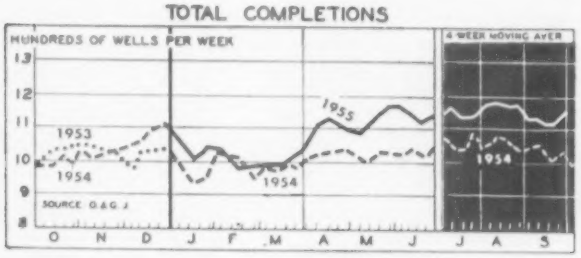
WILDCAT COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



TOTAL COMPLETIONS



ACTIVE ROTARY RIGS*

Area	10-10-55	Change from 10-3-55	Change from 10-11-54
Gulf Coast	610	0	107
N. and W. Texas-New Mexico	898	—4	166
Arkansas-N. Louisiana-E. Texas	171	—2	6
Oklahoma	318	—12	24
Kansas-S. Nebraska	183	—2	44
Illinois-Eastern	132	2	—19
Rocky Mountain	299	12	54
Pacific Coast	142	4	10
Total United States	2,753	—2	392
Western Canada	192	12	46

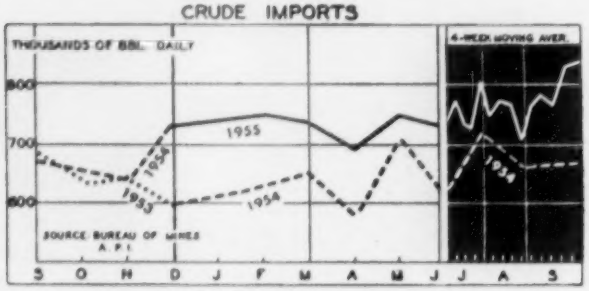
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 8, 1955

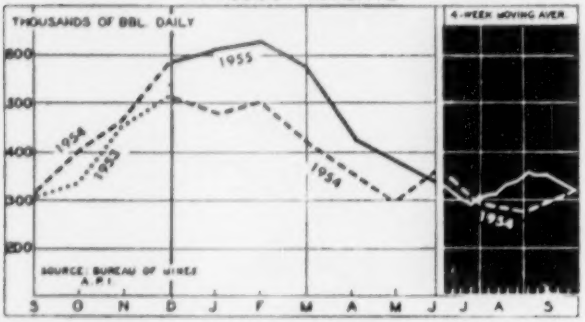
	Total of all wells: Comp	Oil	Gas	Dry	Footage	Cum 1955	Cum 1954	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1955: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	10,838	62	85	0	0	0	1	1	0	0	0	60	60
Arkansas	16	8	0	8	49,419	615	471	0	0	0	3	3	28	1	3	134	166
California	55	35	5	15	302,576	1,882	1,827	0	0	2	15	17	34	0	11	329	374
Colorado	38	8	3	27	217,712	1,155	1,012	0	0	0	19	19	15	0	22	574	631
Illinois	96	40	1	55	239,305	2,981	2,178	2	0	0	20	22	51	0	4	426	481
Indiana	13	4	0	9	22,862	568	624	1	0	0	4	5	11	0	0	220	231
Kansas	93	41	3	*49	335,268	3,874	3,188	0	0	1	22	23	110	1	29	638	778
Kentucky	38	20	4	14	46,184	1,178	869	0	0	0	8	8	43	0	9	240	292
Louisiana	79	47	3	29	544,858	3,061	2,647	6	1	1	12	20	93	63	24	343	523
North	37	21	2	14	140,640	1,588	1,448	3	0	0	6	9	22	6	4	143	175
South	42	26	1	15	404,218	1,473	1,199	3	1	1	6	11	71	57	20	200	348
Michigan	13	4	0	9	31,778	411	427	0	0	0	5	5	8	0	1	161	170
Mississippi	9	2	0	7	66,142	347	309	0	0	0	6	6	14	0	0	121	135
Montana	25	2	3	20	87,086	291	243	0	0	0	19	19	10	0	1	112	123
Nebraska	23	7	1	15	122,509	657	329	2	0	1	10	13	36	0	1	268	305
New Mexico	31	19	9	3	113,900	1,302	836	0	0	0	1	1	32	2	9	93	136
Northwest	10	0	9	1	26,956	432	299	0	0	0	0	0	5	1	9	27	42
Southeast	21	19	0	2	86,944	870	537	0	0	0	1	1	27	1	0	66	94
North Dakota	7	4	0	3	43,466	197	232	0	0	0	2	2	5	0	0	48	53
Ohio	22	14	3	5	38,917	924	880	0	0	0	0	0	3	0	6	16	25
Oklahoma	131	87	5	†39	462,811	6,565	6,906	2	1	2	14	19	115	15	24	519	673
Pennsylvania-New York	24	8	7	9	40,994	1,186	1,790	0	0	0	0	0	0	0	7	10	17
Texas	356	218	5	133	1,635,481	15,551	14,232	16	2	2	84	104	611	82	105	3,192	3,990
Southwest (1 & 4)	47	26	2	19	184,612	2,377	2,002	3	1	1	11	16	94	27	32	599	752
Gulf Coast (2 & 3)	39	15	2	22	248,828	1,924	2,026	0	0	1	15	16	71	43	33	507	654
East (5 & 6)	26	11	†0	15	107,257	757	752	0	0	0	8	8	21	4	8	254	287
North Central (7-B & 9)	115	65	0	50	383,669	5,868	5,377	7	0	0	24	31	302	0	13	1,265	1,580
West (7-C & 8)	109	84	0	25	632,127	3,815	3,302	6	0	0	25	31	119	1	10	541	671
Panhandle (10)	20	17	1	2	78,988	810	773	0	1	0	1	2	4	7	9	26	46
Utah	4	0	0	4	11,397	77	63	0	0	0	2	2	6	0	5	49	60
West Virginia	16	0	11	5	50,871	496	465	0	0	0	2	2	6	0	9	15	24
Wyoming	18	13	1	4	67,033	655	980	0	0	1	3	4	17	0	7	148	172
Miscellaneous (S. D.)	2	0	0	2	5,045	45	97	0	0	0	2	2	3	0	2	35	40
Total United States	1,110	581	64	465	4,546,452	44,080	40,990	29	4	10	254	297	1,265	164	279	7,751	9,459
Total previous week	1,328	733	95	500	5,306,276			38	10	4	212	264	1,236	160	269	7,497	9,162
Total October 9, 1954	1,090	592	98	400	4,282,361			28	3	6	168	205	1,101	111	305	6,827	8,344
Western Canada	59	44	2	13	242,348												

Service wells included: *1, †2, 14

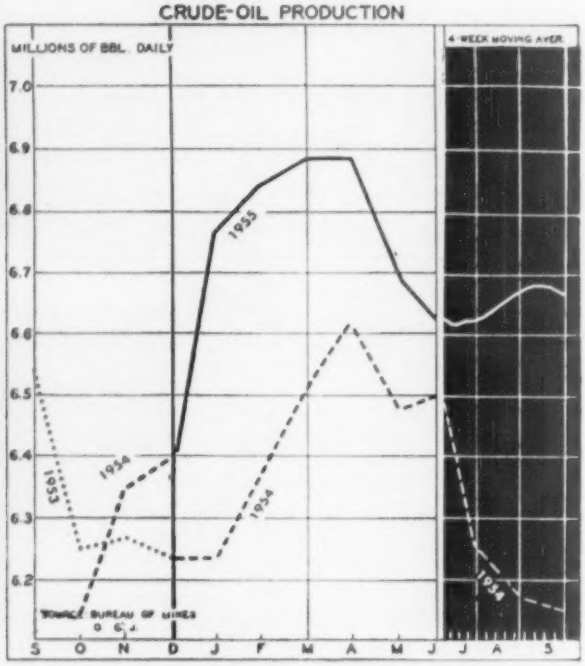
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

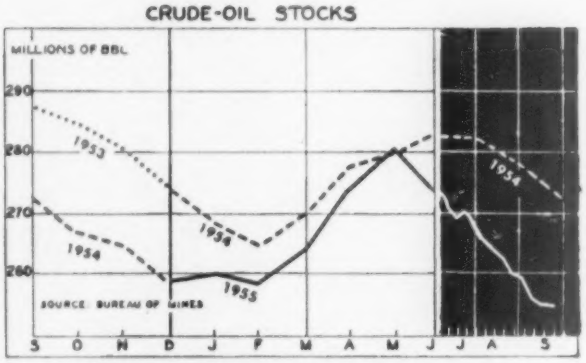


DAILY AVERAGE PRODUCTION FOR WEEK

	October 8			Oct. 1
	Crude oil	Lease condensate	Total	total
Alabama	4,100		4,100	4,200
Arkansas	72,700	400	73,100	73,650
California	977,500		977,500	980,200
Colorado	151,300		151,300	151,000
Eastern	50,800		50,800	50,800
Florida	1,375		1,375	1,350
Illinois	230,200		230,200	229,300
Indiana	29,900		29,900	29,900
Kansas	305,600		305,600	313,300
Kentucky	41,000		41,000	43,700
Louisiana	695,600	58,800	754,400	746,700
North	112,600	2,800	115,400	114,700
South	583,000	56,000	639,000	632,000
Michigan	30,600		30,600	30,400
Mississippi	102,900	4,400	107,300	104,200
Montana	42,300		42,300	42,100
Nebraska	28,100		28,100	27,400
New Mexico	226,000	2,500	228,500	230,900
North Dakota	24,600		24,600	26,900
Oklahoma	533,900		533,900	534,400
Texas	2,763,300	48,300	2,811,600	2,747,500
Dist. 1	50,000	475	50,475	50,050
Dist. 2	143,700	7,925	151,625	145,550
Dist. 3	408,000	23,025	431,025	426,800
Dist. 4	237,000	5,100	242,100	237,025
Dist. 5	51,000	400	51,400	50,175
Dist. 6	123,300	4,650	127,950	124,125
East Texas field	212,500		212,500	207,100
Dist. 7-B	149,000	50	149,050	146,050
Dist. 7-C	165,000	4,100	169,100	170,100
Dist. 8	928,800	2,000	930,800	904,000
Dist. 9	205,000	400	205,400	196,375
Dist. 10	90,000	175	90,175	90,150
Utah	6,500		6,500	6,600
Wyoming	274,700		274,700	276,300
Others	†200		†200	200
Total U. S.	6,593,175	114,400	**6,707,575**	6,651,000
Change from previous week, up			**56,575**	
Canada	†285,950		†285,950	†355,475
Total U. S. production January 1-October 8			1,892,412,725 bbl.	
Same period last year (crude plus cond.)			*1,786,397,309 bbl.	

*Includes 27,355,400 bbl. condensate. †Week ended previous Monday. ‡ D. 100, Nev. 100.

CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	10-1-55	9-24-55	10-2-54
Pennsylvania Grade	3,259	3,262	3,091
Other Appalachian	1,970	1,904	1,626
Illinois, Indiana, Michigan	10,081	9,995	13,014
Nebraska, North Dakota	2,169	2,199	1[illegible]
Kansas	7,968	8,003	10,196
Oklahoma	20,629	20,766	24,142
Arkansas	2,602	2,530	3,399
Louisiana	16,199	16,256	15,879
North	2,600	2,726	2,515
South	13,599	13,530	13,364
Mississippi	3,268	3,149	2,890
New Mexico	7,218	7,461	9,353
Texas	119,657	119,628	126,834
East Texas proper	9,368	8,871	10,876
West Texas	56,742	57,074	56,251
Texas Gulf	24,372	24,546	25,115
Other Texas	29,175	29,137	34,592
Wyoming	14,669	14,654	12,644
Other Rocky Mountain	5,111	5,015	4,764
California	27,798	28,019	32,081
Foreign	†12,200	11,793	10,171
Total	254,798	254,634	270,084

*Bureau of Mines. †Includes 3,255,000 bbl. in California. ‡Included with Kansas.

CURRENT STATISTICS — SELECTED MONTHLY DATA

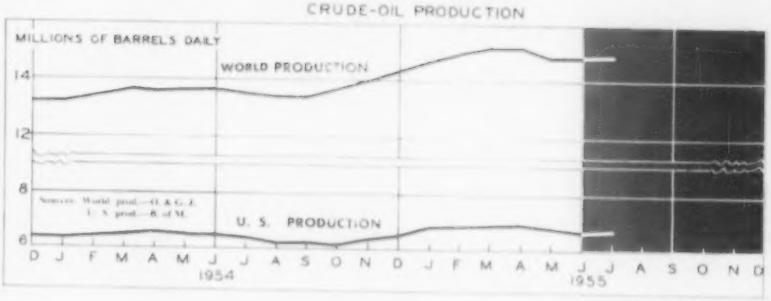
A.P.I. statistical reports, usually shown on this page, for week ended October 7 not available due to Columbus Day holiday in New York City

CRUDE PRODUCTION

(Thousands of barrels daily)

Month—	U.S.	World
July 1955	6,632	14,989
June 1955	6,613	14,813
May 1955	6,677	14,850
November 1954	6,346	13,934
July 1954	6,259	13,528

CRUDE-OIL PRODUCTION

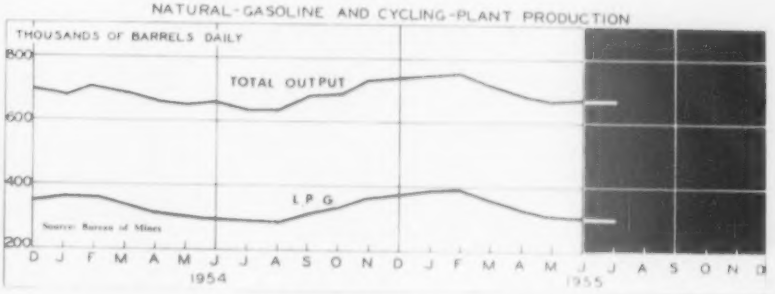


PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

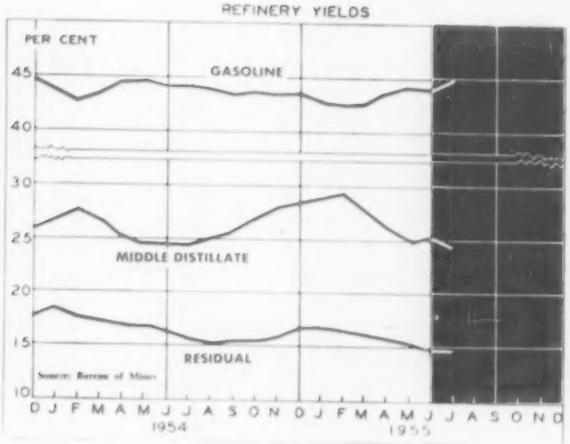
(Thousands of barrels daily)

Month—	L.P.G.	Total
July 1955	316	679
June 1955	313	672
May 1955	317	670
November 1954	360	723
July 1954	286	642

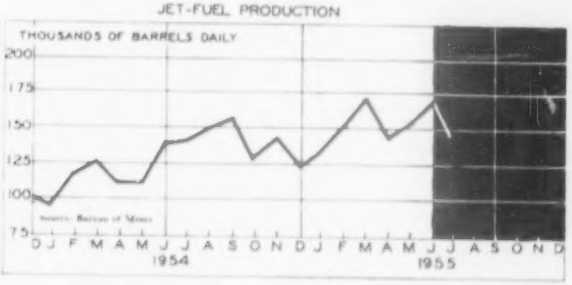
NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



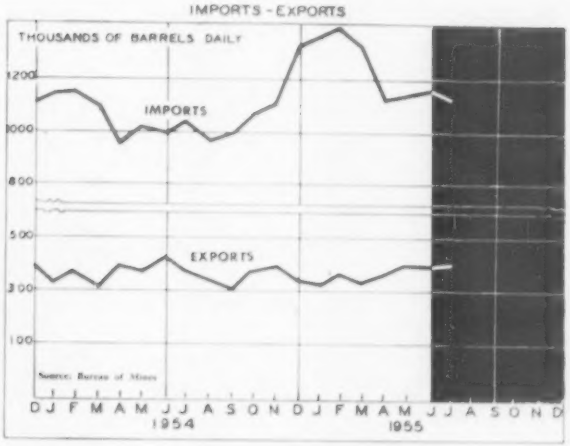
REFINERY YIELDS



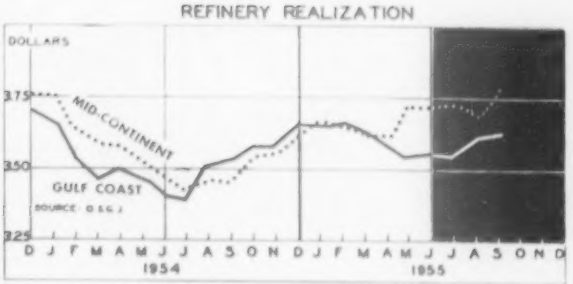
JET-FUEL PRODUCTION



IMPORTS-EXPORTS



REFINERY REALIZATION



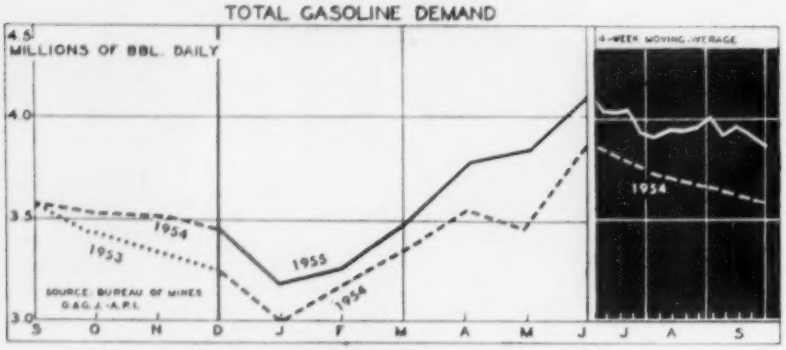
REFINERY REALIZATION

	Sept.* 1955	Aug.* 1955	July 1955	Sept. 1954
Mid-Continent	$3.78	$3.69	$3.73	$3.45
Gulf Coast	3.63	3.62	3.55	3.51

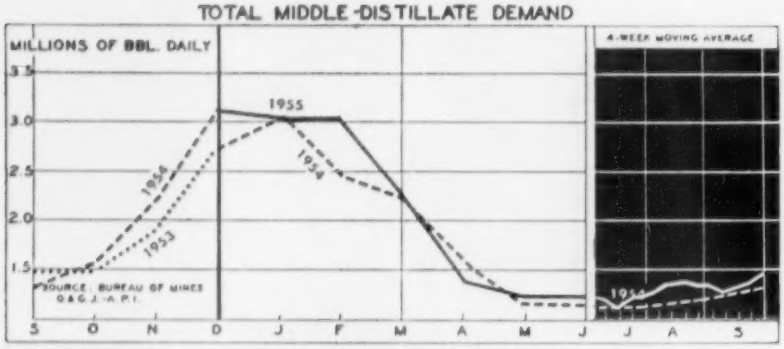
*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

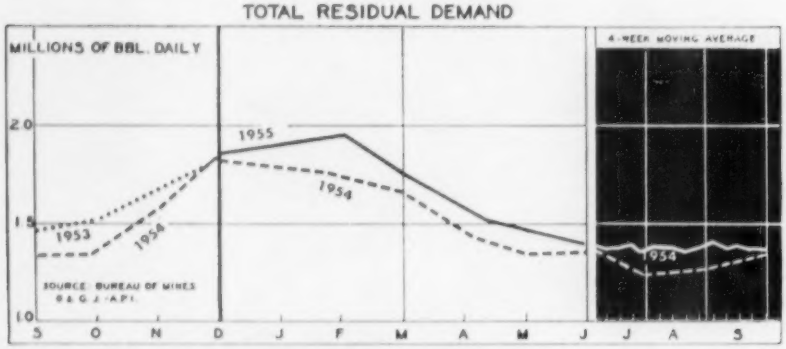
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of October 12, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	11-11.25	11.5-12	10.5-10.75
Premium gasoline	12.25-12.5	13-13.75	12-12.25
42-44 w.w. kerosine	9.25-9.50	10.3	8.75-9.00
No. 2 straw fuel oil	8.25-8.50	9.55	8.5-8.75
No. 6 residual	$1.75-1.85	$2.55-2.75	$2.10-2.20

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	19
200 vis., No. 3 neutral, 0-10 pp.	14.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Largely because of purchases by the Standard Oil Co. (Ind.) in the Middle West and Gulf Coast, gasoline markets are generally strong east of West Coast. Spot buying has aided East Coast residual fuel-oil market with prices unchanged. Price concessions reported in distillates where sellers not in position to wait until expected seasonal increase in demand.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

A.P.I. statistical reports for week ended October 7 not available due to Columbus Day holiday in New York City. A.P.I. information below is for week ended September 30.

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 9-30-55	3,679	3,852
July 1955	3,744	3,847
September 1954	3,391	3,649
October 1954	3,420	3,586
Middle distillate:		
Four weeks ended 9-30-55	1,903	1,495
July 1955	1,862	1,185
September 1954	1,755	1,197
October 1954	1,815	1,370
Residual fuel:		
Four weeks ended 9-30-55	1,089	1,377
July 1955	1,091	1,328
September 1954	1,069	1,258
October 1954	1,086	1,319

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Sour. Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, July 11, 1955.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.60
Middle District	3.47
Southwest Pennsylvania	3.18
West Virginia	3.07
Buckeye Grade	3.01
Zanesville Grade	2.82
Illinois Basin	2.90-3.00

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FOR SALE: 18" x 21" and 20" x 23" modified cycloidal Roots Connersville Air pumps. Either vacuum or pressure; up to 11 psig differential pressure; range 2000-4000 cfm; machines little used; guaranteed mechanically good; roller bearings; late models; price dependent upon application and requirements. Refer all inquiries to Walter Gasser and Associates, P. O. Box 863, Pasadena, Texas.

FOR SALE—Complete Rotary rig, U-10 Drawworks, 7¼ x 14 PHD Pump, both powered by Twin 6 GM 6-71 Motors, 127' Lee C. Moore Mast, 5' base overall, steel flooring, Ideal Type L Swivel, Baash-Ross block, BJ Hook, 4500' 4½" bottleneck drill pipe. Complete with dog house, fuel tank, water tank, light plant, water pump, and all hand tools, now drilling. Box J-118, The Oil and Gas Journal, Tulsa, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.

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AT-3427 Houston, Texas

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3—800# 20 MMCF Absorbers with scrubbers, etc.
2—150 HP 350# WP Lucey Oil Country Boilers Complete with Stacks, etc., and Steel Building.
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1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.

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FAILING 1500 heavy duty drill with 4½x5 pump, automatic pulldown, and mounted on Ford Truck. Write P. O. Box 819, Longmont, Colo. Phone 1333.

FOR SALE—At Oil Hill, Kansas, 4—Cooper Type 80 Twin Engine Compressor Units, with 8½" x 20" Class A and 15½" x 20" Class C Compressor Cylinders. Also, 1—Type 80 Single DO, with 6½" and 10½" x 20" Tandem Compressor Cylinders. All with 18" x 20" Power Cylinders. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

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$50,000 New Spare Parts for Above.

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TOWERS - COLUMNS

1—6' x 58' x ¼" Chrome-lined, 21 Trays.
1—6'6" x 65' x ⅝", 17 Chrome Decks, 5 Chrome Baffles.
1—3'6" x 49' x ⅞" Shell, 28 Trays, 180#.
1—30" x 34'10" x ¼" Shell, 18 Trays.

TANKS - VESSELS

6—1250, 1,000 Bbl. Welded and Bolted.
10—5'8" x 15', 10 x 20', 6 x 20', 5'3" x 38'6", (Chr. Lin. 90#).

HEAT EXCHANGERS

3—Kellogg 2400 sq. ft. Admiralty, 150# psi.
1—Efco Steel Tube 2000 sq. ft., 150# psi.
6—Efco 785 sq. ft. Adm. heat exchangers, 250#.
1—Griscom Russell Admiralty, 742 sq. ft., 150# psi.
3—Struthers-Wells Admiralty, 425 sq. ft., 150# psi.

ATMOSPHERIC HEAT EXCHANGERS

8—715 sq. ft., 850 psig, 304 Stls. St.
6—470 sq. ft., 850 psig., 304 Stls. St.
13—715 sq. ft., 125 psig, 304 Stls. St.
6—715 sq. ft. Admiralty 125 psig, 300° F.

MISCELLANEOUS

1—Lab Petrochem Isoflow Furnace 50,000 BTU/hr.
1—B.J. Hot Oil Pump 3" x 9", 14 stage, 325 gpm, 4620' head, 11-13 nickel chrome impeller, 400 HP st. turbine.
1—Goulds 4" Pump, 400 gpm at 1600' hd.

Partial List Only

WIRE! PHONE! WRITE!

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas, JA 6-1351
Or
2401 Third Ave., New York 51, N. Y., CYpress 2-5701

FOR SALE EQUIPMENT

WILSON GIANT Air Clutch rig with new type treble Derrick and Heavy Substructure, 7¼"x14" PHD Heavy Duty Oil Well Pump powered by LRO Waukesha Motor, 5600' of new drill pipe, also miscellaneous equipment to complete Rig. If interested write or call telephone 3489 or Box 647 Coleman, Texas.

SLIM HOLE RIG—completely truck mounted and unitized—hydraulically raised mast—pull sixty foot stands—G.M. diesel powered capacity 5000 feet slim hole—2500 feet 8⅝—complete inventory, pictures and price on request—Williams Drilling Co., 857 West 19th St., Costa Mesa, Calif.

FOR SALE

6000 ft. 8⅝"—28.35# No. 2 Grade, P.E. Used L. W. Line Pipe, located at Oklahoma City.

FORD CARMAN SUPPLY CO
202 Tri-State Bldg., Tulsa, Okla.
Ph. LUther 5-1949.

FOR SALE:

Refinery equipment located at Winnsboro, Big Sandy, and Mt. Pleasant, Texas. New and used as follows: pumps, bubble towers, tanks, compressors, pipe stills, valves, fittings, control instruments, condenser tubes, still tubes, and still headers.

AMERICAN LIBERTY OIL COMPANY
Engineering Department,
Box 1011,
Mt. Pleasant, Texas

RECONDITIONED BLACK PIPE

8⅝" O.D. .322 wall 28.55 lbs. per foot—100,000 Feet.

12¾" O.D. .375 wall 49.56 lbs. per foot—35,000 feet.

20 foot random lengths lapweld.

Beveled ends ready for installation in gas, water, oil lines or structural purposes.

Complete inventories of all sizes black and galvanized pipe also available.

WRITE—WIRE—PHONE

Sonken-Galamba Corporation
2nd and Riverview (X-160)
Kansas City 18, Kansas
ATwater 9305

FOR SALE EQUIPMENT

GARDNER-DENVER two-stage gas compressor unitized unit powered by 250 H.P. Buda motor and all equipment, gauges and coolers necessary to operate. All in first class condition. Gulf Southwest Service Co., P. O. Box 1328, Shreveport, La. Telephone 2-6428.

TWO 330 H.P. USED Cooper-Bessemer GMX 6 TF packaged gas compressors. Excellent condition. Designed for suction pressure zero psi discharge 500 psi. Southwest Industries, Inc., Box 7773, Houston 7, Texas.

FOR SALE—National 3-A 6 Machine, excellent condition—with practically new D-12000 Caterpillar Diesel. Complete casing, steel and fishing tools. Mostly new. Box J-190, The Oil and Gas Journal, Tulsa, Oklahoma.

GLYCOL DEHYDRATION Unit complete. Designed capacity 60 million cubic feet at 700# pressure, 50° depression. 8—5½x20 compressor cylinders. J. C. McConnico, 810 Colcord Bldg., Okla. City phone CEntral 2-6318.

SEISMOGRAPH CABLE TRUCK with special "Sewall" body using 5 cable handlers (Squirts) and 5 cable bins, mounted on 1952 Dodge Power Wagon. Excellent Condition. Texas Seismograph Company, Box 2069, Wichita Falls, Texas.

FOR SALE

Subject to prior sale we offer 90,000' of 10¾" O.D. 35.66 Seamless Range 3, Grade "A" J & L Pipe Cleaned and Beveled. Suitable for high pressure line or surface casing.

SABINE PIPE & SUPPLY CO.
Phones 3094—3095
P.O. Box 111, Kilgore, Texas

Stop Tong Breakage!

ARMITE DRILL COLLAR & TOOL JOINT COMPOUND

ARMITE LABS., 5609 Broad St., Los Angeles 1, Calif.
Petro. Industries Consultants, C A. Caracas, Venez.

NEW TRAILERS

DROP—BED "TYPE" **$2,731.48**
FLAT—BED "TYPE" **2,638.89**

Plus 3% Tax

Built To Order

PASKO MACHINERY & STEEL
1721 CHICAGO DRIVE S. W.
GRAND RAPIDS, MICHIGAN

FOR SALE

GASOLINE PLANT EQUIPMENT LOCATED IN LOUISIANA

1—36' x 48' x 14' Stefco Steel Building.
1—225 H.P. Miller Gas Engines Directly connected to 17½" Compressor Cylinders.
5—#345 S.W. Gas Coolers.
1—6' x 10' Vertical Welded Scrubber Tank.
1—72" Dia. x 48' Tulsa Type Absorber #1080 W/23 Trays.
1—6' x 20' Welded and Riveted Steel Horizontal Vent Tank.
4—8' x 10' Welded and Riveted Steel Horizontal Scrubber Tanks.
2—5" Dean Hill Cent. Pumps. Connected to 30 H.P. Westinghouse Motors.
1—36" x 49' 30 Tray Stabilizer. Welded Construction. Will Handle 60,000 Gals. Gasoline Per Day.
1—Type K24-300-2-200-250 Stabilizer Kettle.
1—200 H.P. Hope Gas Engine Direct Connected to 125 KW 480 Volt 3 Phase, 60 Cycle General Electric Generator.
Also Several Recording Regulators, Pumps, Compressors and Piping.

For Detailed Inventory, Write or Wire
SHELL OIL COMPANY,
Box 193, New Orleans, Louisiana
Attention J. H. Cranfill.

FOR SALE EQUIPMENT

EMSCO 250 RIG, complete with Emsco double mast. Excellent condition. 4,000-ft. practically new, 4½-in. drill pipe. Rig now running. Bargain. Phone FOrest 8-5886, 421 Meadows Bldg., Dallas, Tex.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply, Tulsa.

FOR SALE—One Ingersoll-Rand DR-600 gyro-flo rotary air compressor truck mounted. Excellent condition. Write P. O. Box 819, Longmont, Colo. Phone 1333.

FOR SALE: Two Dubbs Upshot type heaters. One for Cracking with 44 ft.—4-6 chr. tubes and headers for two coil operation. One for topping with 4½x30' carbon steel tubes. Both completely equipped and in perfect condition. Phone 3225 or 3226, Electra, Texas.

FINAL REFINERY LIQUIDATION

POCATELLO, IDAHO

TOWERS

4'x59' 23 trays, 160 PSI.
7'6"x41'7" Reactor, 160 PSI
4'6"x40' 13 trays, 180 PSI
2'x47' 20 trays, 200 PSI.
2'x47' 20 trays, 375 PSI.
3'x49' 28 trays, 425 PSI.
2'x37' 16 trays, 250 PSI
5'x36' Scrubber, 240 PSI

FURNACES

Crude Oil, 8 million BTU/hour comb. oil & gas burners, chrome tubes (2).
Cracker, light oil, 10 million BTU/hour comb. oil & gas burners, chrome tubes.
Vacuum, 15 million BTU/hour comb. oil & gas burners, chrome tubes.

HEAT EXCHANGERS

Steel Tubes, 94 to 550 sq. ft. (5)
Adm. Tubes, 140 to 440 sq. ft. (7)

PUMPS

HOT OIL TRANSFER
CENTRIFUGAL

COMPRESSORS

170 to 300 CFM Elec. & Steam.
1406 SCFM Gas Driven.

LOADING RACKS

28 & 8 Car R.R., 3 & 2 Truck.

STEEL BUILDINGS

(11) from 150 sq. ft. to 2500 sq. ft.

BOILERS

3—153 HP 160 PSI Water Tube.
1—250 HP 150 PSI Stirling.
2—4'x135' Steel Stacks

ETHYL BLENDING PLANT

Complete Unit.

METERS & CONTROLS

Quantity—All Types.

PIPE, VALVES & FITTINGS

½" to 12" Welded and Seamless.

STORAGE TANKS

(45) from 500 to 35,000 bbl. ALL WELDED.

WRITE FOR COMPLETE INVENTORY

Heat & Power Co., Inc.

60 East 42 Street, New York 17, N. Y., Murray Hill 7-5280
Pocatello, Idaho, Phone Poc. 5490

FOR SALE EQUIPMENT

DRILLING RIG 5½ Keystone. Trailer type. Lines. Running condition, all necessary tools. An exceptional buy $2500.00. M. J. Regan Pipe Co., Coffeyville, Kans.

1200' 8⅝" 17 lb. line. Number one. Anti rust coating. $1.00. M. J. Regan Pipe Co., Coffeyville, Kans.

FOR SALE—Approximately 700' of 16" OD Seamless Casing. Approximately 1400' of 13⅜" 54# used Seamless Casing. H. C. Bennett, Drawer #31, Augusta, Kansas.

FOR SALE: Complete rotary rig, Wilson Titan drawworks, 129 ft. Emsco mast. Box J-183, The Oil and Gas Journal, Tulsa, Oklahoma.

THREE CAR Patterson Steel Company Tank Carloading Rack. Priced for quick sale. For full details write or call South Texas Pipe & Supply Co., P. O. Box 3188, Phone TUlip 3-9337, Corpus Christi, Texas.

FOR SALE: 3 Type 80 Cooper Twin Gas Engine Driven Compressors rebuilt like new ready to go. Compressor Cylinders to suit. Write or phone W. S. Smith, 205 Thompson Bldg., Tulsa, Okla. LUther 2-5473.

FOR SALE—Our gasoline plant north of Arkansas City, Kansas. Complete details and price furnished upon request. Contact Patridge, Cities Service Oil, Bartlesville, Oklahoma.

GA 350 EMSCO rig complete with two D 17,000 Caterpillar diesel engines, Lee C. Moore 126' mast, 7¼ x 14 G-D pump, Two QRC CIW 4,000# preventers & 5 x 10 G-D mud mixing auxiliary pump with Waukesha engine, good condition. Operating in area of Natchez, Mississippi; priced to principals for quick sale, subject to prior sale with or less, 4" OD drill pipe. Wire or call Clinch Drilling Company, Jackson, Mississippi.

FOR SALE: Following used lapweld Plain End Used Line Pipe Located in Ohio. Subject to Prior Sale. Attractively priced 10,000 ft. 6⅝" O.D. x .250" Wall. 3,000 ft. 8⅝" O.D. x .250" Wall. 19,800 ft. 8⅝" O.D. x .219 Wall. 2,500 ft. 8⅝" O.D. x .322" Wall. 1,840 ft. 8⅝" O.D. x .344" Wall. 36,000 ft. 10¾" O.D. x .365" Wall. 2,000 ft. 12¾" O.D. x .312" Wall. WIRE—WRITE—PHONE THE BUCKEYE SUPPLY COMPANY, 18 Harrison Street, Zanesville, Ohio. Phone—GLadstone 2-3641.

EQUIPMENT WANTED

WANT 3,500' to 4,500' Rotary Rig near new. Send inventory and asking price. D. D. Willett, P. O. Box 1246, Palmer, Alaska.

7¼ x 12 and 7¼ x 14 mud pumps with engine skid mounted. Box J-173, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: New and used bolted type steel tanks, all capacities, also pressure and regular storage tanks. A. Greenspon Pipe Co. Inc. 8890 Ladue Rd. St. Louis 24, Missouri.

HELP WANTED

EXCELLENT opportunity with large independent oil company for graduate engineer located in Alice, Texas. Must be experienced in Gulf Coast well completion and some experience in production. Replies confidential. P. O. Drawer 1830, Wichita Falls, Texas.

GEOPHYSICIST. A major contracting geophysical company has an opening for a geophysicist to be in charge of its foreign department. Must have 10 years experience, the majority in foreign service, a college education, and an ambition to make new acquaintances. Write details of age, education, experience, availability for travel, etc., to Box J-160, The Oil and Gas Journal, Tulsa, Oklahoma. Our employees know of this ad.

CHEMICAL ENGINEER

Houston refinery has opening for graduate Chemical Engineer with minimum two years actual engineering experience in petroleum refinery. Salary open.
Send complete resume to

P. O. Box 5008,
Harrisburg Station,
Houston 12, Texas.

HELP WANTED

EXPERIENCED MAN over 60 years of age as Caretaker and Superintendent of compressor making gasoline out of gas. West Texas, comfortable living quarters. EMPIRE OIL OF NEW JERSEY, 2630 Republic National Bank Building, Dallas 1, Texas.

WANTED: Sales Engineer experienced in Internal Combustion Engine Field, Natural Gas, Butane, Diesel and Gasoline engines. Must have knowledge of Oil Field applications. Give qualifications, references and salary expected in first reply. Write Box J-180, The Oil and Gas Journal, Tulsa, Oklahoma.

PROJECT ENGINEERS

CHEMICAL AND MECHANICAL ENGINEERS

B.S. plus 5 years experience in Chemical and Refinery Units.

Work includes supervision equipment selection, layout and design.

Send complete resume of background, experience and salary requirements to:

TELLEPSEN PETRO-CHEM CONSTRUCTORS
P. O. Box 2536 Houston, Texas

PLANT EQUIPMENT INSPECTORS

Senior Inspectors for company operation in Saudi Arabia and company engineering department in The Hague, Holland. Should be graduate engineers with minimum 8 years' experience in design or inspection of petroleum processing plants and equipment, 5 years' actual inspection experience necessary.

In Saudi Arabia—will advise operating department on code and equipment limitations, develop inspection methods, supervise and conduct inspections.

In The Hague—will inspect and approve equipment and material purchases, advise and assist foreign manufacturers to comply with U. S. Standards and Specifications.

Salary commensurate with education and work experience. Write giving full particulars regarding personal history and work experience.

Recruiting Supervisor, Box 72

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE
NEW YORK 22, NEW YORK

FOREIGN SERVICE MAJOR OIL COMPANY

Petroleum Engineer

Degree and at least four years of reservoir engineering experience. Must be well grounded in practical production practices.

Engineer

Degree, two to four years practical experience drilling mud control.

Married status if desired—both jobs.

For Interview, Write

Box J-192,

The Oil and Gas Journal,
Tulsa, Oklahoma

HELP WANTED

GRADUATE ENGINEERS for permanent position on products pipe line in Pennsylvania. Experienced men preferred. Write Post Office Box 22, Harrisburg, Pa.

SOUTH AMERICA. Major Oil Company. Our Fee paid. Mechanical, Petroleum, Civil and Chemical Engineers. Geologist (must be single)—All requiring Degree, experienced or inexperienced. Tool Pusher, three years experience. On all jobs age limit is 40. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 South Main, Tulsa, Oklahoma—Gibson 7-3193.

ENGINEER, PROCESS—For small southwest refinery should have some experience thermal cracking and catalytic treating—good opportunity young man—write fully experience, salary. Replies confidential. Box J-175, The Oil and Gas Journal, Tulsa Oklahoma.

Refinery Superintendent

For independent refinery in Southwest Texas, with growing commercial business and military contracts. Should have 10 years experience in plant and laboratory operations, including jet fuel production and testing; also requires knowledge of tank truck operations.

Submit resume of experience along with availability and expected salary to

BOX J-162,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

GASOLINE PLANT REPAIRMAN

Experienced on angle and horizontal engine-compressors, turbines, reciprocating and centrifugal pumps, oil field engines, some light welding desirable. Particularly familiar with preventive maintenance programs. North central Texas locations. Replies should contain details of experience and references.

Box J-132, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS

Chemical and Oil Refining

Furnace Builder requires engineers with experience in design and operation of processing heaters used in petroleum and chemical industries — location New York. Salary, incentive plan and excellent working conditions.

Box J-150
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

ACCOUNTANTS, Chemical Engineers, Mechanical Engineers, Geologists, Physics Graduates, female stenographers, Linguists desired. No fee. Oil Industry Employment Service, Box 2603, Tulsa, Okla.

DIVISION GEOLOGIST. Progressive Independent with Division Headquarters in Billings, Montana for operations in Montana, North Dakota, South Dakota and Wyoming has opening for Division Geologist. Must have 8 to 10 years experience in all phases of petroleum exploration with at least 3 years Rocky Mountain experience, preferably in Wyoming and Montana. Box J-187, The Oil and Gas Journal, Tulsa, Oklahoma.

COLLEGE GRADUATES in Chemical, Mechanical, Petroleum Engineering, with experience or without experience, are wanted for several openings at beginning and higher levels in the Los Angeles County Air Pollution Control District. Salaries begin at $489 and $608 month for 40-hour, 5-day week. Air Mail brief resume of education and experience to A. Zill, Los Angeles County Civil Service Commission, 501 N. Main, Los Angeles 12, Calif. Include telephone number. There will be no written examination. Employment interviews will be held in various parts of the United States. Offers of appointment can be made at that time.

WANTED

GAS AND RESERVOIR ENGINEER
For Estimation of Gas Reserves

DRILLING ENGINEER
With Knowledge of Mud Problems and Drilling

PIPE LINE ENGINEER
Engineering Supervisor for Pipeline in Operation

For Work on De Mares Concession in Colombia. Only Graduate Engineers Considered.

BOX J-170,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

PETROLEUM ENGINEERS

Major Oil Company has openings for graduate Junior and senior Petroleum Engineers in Production and Gas Operations in Venezuela. Salary commensurate with experience.

Please send details of experience

P. O. BOX NO. 35
BOWLING GREEN STATION
NEW YORK 4, N.Y.

DRILLING EQUIPMENT ENGINEER

Foreign Service

With degree in Petroleum or Mechanical Engineering, plus minimum of 5 years' experience in the design, manufacture, use and maintenance of drilling equipment and supplies. A knowledge of the various drilling equipment manufacturers and their products necessary. Salary dependent upon experience and qualifications.

Write giving full particulars regarding personal history and work experience. Please include your telephone number.

Recruiting Supervisor, Box 74

ARABIAN AMERICAN OIL COMPANY
505 PARK AVENUE, NEW YORK 22, NEW YORK

HELP WANTED

OPERATING SUPERVISOR—Small expanding company producing diversified industrial organic chemicals has opening for chemical engineering graduate with chemical plant operating experience. Unusual opening for man possessing individual initiative who is prepared to take charge of entire plant operations. Submit resume and salary requirement. Box J-186, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY SUPERINTENDENT WANTED

for refinery located in Middle West. 5000 barrel crude capacity, 2250 barrel Thermal Cracking, 1000 barrel Platforming and 1500 barrel Naphtha Unit.

Box J-181, The Oil and Gas Journal, Tulsa, Oklahoma.

SAFETY DIRECTOR

to supervise the safety activities of natural gas transmission company. Location: Detroit. Must be willing to travel. Salary open. Include resume of experience and education. All applications treated confidentially.

Box J-182,
The Oil and Gas Journal,
Tulsa, Oklahoma.

GEOLOGISTS

Required for

COLOMBIA, SOUTH AMERICA

By major affiliate of Standard Oil Company (New Jersey). Immediate openings for experienced Field Geologists and Geological Field Party Chiefs. Attractive salary and benefit plans.

Send brief outline of education and experience and state telephone number. Arrangements will be made by telephone for qualified applicants to be interviewed in:

Calgary on October 21 and 22
Denver on October 24 through 27
Casper on October 28 and 29
Salt Lake City, October 31 and November 1
Billings, Montana, November 3

Box J-193,
The Oil and Gas Journal,
Tulsa, Oklahoma

CORROSION ENGINEER

Experienced in cathodic protection work on bare and coated lines. This is a permanent position and offers unusual opportunities to a well qualified man. A degree in engineering is required with a minimum of five-years experience in related work. Immediate location would be in Illinois or Indiana. All replies will be held in strict confidence. Send resume of education, experience, and salary requirements, also photograph to:

Sohio Pipe Line Company

Attn.: R. D. Draus,
Industrial Relations Manager
407 North Eighth Street
St. Louis, Missouri

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED—Landman experienced in contracts, titles, and leasing. Preferably one with major oil company background. For medium-sized independent. Box J-179, The Oil and Gas Journal, Tulsa, Oklahoma.

EXCELLENT OPPORTUNITY with Petroleum Engineering Consulting Firm for graduate Petroleum or Natural Gas Engineer, under 30, in South Texas Area. Work phase includes gas testing, hydrocarbon analysis and related work. Must be free to travel. In reply, give brief personal history, experience and salary expected. Include photograph. Replies confidential. Box J-166, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced Seismic Computer to train for Party Chief position. Write, giving full account of experience and education. Box J-174, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Small active Company desires Junior Geologist for general exploration, Oklahoma and Kansas experience desirable. Box J-167, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Subsurface geologist, with minimum 5 years experience in southern Arkansas and northern Louisiana, to be located in Shreveport. Box J-177, The Oil and Gas Journal, Tulsa, Oklahoma.

ORGANIC-ANALYTICAL CHEMIST: Immediate opening for recent B.S. or M.S. chemist or a man with some experience. Necessary to have a strong organic and analytical background. New air-conditioned research laboratories. Excellent employee benefits program. Address letter stating education, experience, and salary requirements to Personnel Division, Continental Oil Company, Ponca City, Oklahoma.

PETROLEUM ENGINEER to handle broad mechanical engineering function of newly organized engineering section. Will involve working closely with operating personnel and reservoir engineering. Four to six years' experience with three years field work, and two years' mechanical desirable. Salary commensurate with experience and ability. Location South Arkansas. Write outlining education and experience to Personnel Department, Murphy Corporation, El Dorado, Arkansas.

MAINTENANCE SUPERVISOR — Attractive opening with small, progressive, expanding, chemicals plant in Mid-Atlantic State. Excellent opportunity for ambitious, resourceful engineering graduate with past maintenance experience. The work is interesting, diversified, and includes both maintenance of existing equipment and construction of new facilities. Submit resume and salary requirement. Box J-185, The Oil and Gas Journal, Tulsa, Oklahoma.

MAINTENANCE SUPERVISOR — Small midwestern refinery needs expert maintenance man able plan carefully, experienced with Dubbs Thermal and Poly Units, operating experience helpful, answer complete detail experience and salary desired. Box J-176, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER for production and processing equipment design. Research possibilities. Experience in oil and gas production and processing preferred. Salary commensurate with experience. Replies confidential. Sivalls Tanks, Inc., Box 1152, Odessa, Texas.

WANTED

WILL PURCHASE large or small producing royalties. 35 years in royalties. Witwer, P. O. Box 2453, Tulsa, Oklahoma.

WANT 1 to 4 or more producing oil wells. Fairly shallow or proven shallow lease. Full details to 1175 California, San Francisco PR 5-3944.

OIL PROPERTIES WANTED. "Oil properties wanted, settled or semi-settled production of 100 to 2,500 barrels daily in Oklahoma and Kansas. Property must stand thorough inspection. Contact Morris Sitrin, 1215 First National Building, Tulsa, Oklahoma with particulars.

RELIABLE MANUFACTURER of Gas Engine parts and repairs, also handling complete line of general oil field maintenance, and distributors for several national lines, desires one or two additional lines of oil field equipment for distribution throughout the Panhandle area. Write P. O. Box 680, Pampa, Texas.

SITUATIONS WANTED

FOREIGN EXPLORATION MANAGER Geologist, experienced both Middle East and South America. Presently employed as major company exploration supervisor. Available to well financed independent planning extensive foreign exploration. Box J-172, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 27, family, BS & MS, 3½ years diversified subsurface experience with major company, Rocky Mountain area, desires position with small to medium sized aggressive company in Rocky Mountain area, preferably Denver. Box J-153, The Oil and Gas Journal, Tulsa, Oklahoma.

GENERAL MANAGER - Operator Independent oil company available new connection October 1 to 31. Consolidation reason for change. Also experienced oil accountant, taxes, office management. Kellum, 1102 East Mulberry, San Antonio.

SUBSURFACE GEOLOGIST, 30, 5 years with Major in Mid-Continent area, desires relocate to Denver or West Coast. Box J-154, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST. Nineteen years experience Oklahoma, Texas and San Juan Basin. Eleven years as District Geologist. Able to supervise Geological Department. Box J-188, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER, M.S. degree. Thirteen years diversified experience in Refining and Natural Gasoline field. Desire responsible position in operations, engineering, construction or organization, sales. Box J-164, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—15 years excellent experience in domestic and foreign oil production covering both planning and operational phases of primary and secondary recovery. Positions held include assistant division reservoir engineer, chief petroleum engineer major producing company. Degree in geology. Desires affiliation with sound organization able to offer responsibility and opportunity for growth. Box J-169, The Oil and Gas Journal, Tulsa, Oklahoma.

MICROPALEONTOLOGIST, Ph.D. geology, three years experience major oil company Texas Gulf Coast. Desire permanent location as paleontologist or geologist. Box J-171, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST nine years West Texas experience with working knowledge of land and production available full or part time. Reply Box J-168, The Oil and Gas Journal, Tulsa, Oklahoma.

PILOT. 43 years of age, 6000 hours, 4 years Navy, 5 years C.A.A., 2 years Instrument Instructor, Airline Transport rating, DC-3, Helicopter rating. Desires connection preferably with drilling or related industry. C. V. Timmens, 507 N. Faulkner, Pampa, Texas.

SUBSURFACE GEOLOGIST, 33, presently employed with 10 years major company exploration experience. Past five years in Rocky Mountains. Desire responsible position with small company or independent. Willing to move. Box J-191, The Oil and Gas Journal, Tulsa, Oklahoma.

PROCESS PLANT ENGINEER

15 years responsible experience in design, construction, and operation of hydrocarbon process plants, including gasoline plant and field processing. Speaks Spanish. Presently in South America, available shortly.

Box J-189, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

FARMS AND RANCHES

7400 ACRE RANCH near Mangum, Okla., one-half mineral. Price $26.50 per acre. R. P. Willis, 917 City Nat'l. Bldg., Wichita Falls, Texas.

2400 ACRE Ranch & Farm near Laurel, Miss., all fenced and cross-fenced with houses and corrals. Carrying 600 head of cattle. Ideal for fishing and camping. Cost to improve this Ranch was approximately $300,000. Asking $175,000 with part being financed. C. F. Martin, Box 362, Laurel, Mississippi.

STRIP LOG CABINETS

MORE LOGS ARE FILED in Kraftbilt Strip Log Cabinets than all others combined. Loaded drawers glide smoothly on roller bearings. Three drawers per section; add sections as needed. Built to last a lifetime! Send for new Catalog 1054-B. Ross-Martin Co., P. O. Box 800-A, Tulsa 1, Oklahoma.

LEASE AND DRILLING BLOCKS

CONTACT A. L. Bowles, Box 947, Ada Okla., for Drilling Deals, Oil Investments.

WILL LEASE my West Texas land for uranium or oil prospecting. Box 419, Upland, California.

I HAVE THEM; you can get them—structures with shallow production. Major companies and others have much acreage here. N. M. Sauls, Geologist, Cookeville, Tenn.

WANTED

Producing Royalties
Settled Production
and
Good Lease Prospects

Send Full Information

H. HALL
Box 1781, Tulsa 1, Okla.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis, Mo.

BUSINESS OPPORTUNITIES

OIL INVESTMENT BUSINESS—Capital of $75,000 to $250,000 required—$20,000 now, balance as development progresses; Investment about 70% tax deductible. Confidential. F. Heldt, 500 S. St. James, Evansville, Ind.

WE HAVE TEXAS CLIENT

Who has asked us to find them from 500 to 5000 barrels per day settled production, Texas, Oklahoma, Louisiana or New Mexico. Inspection can begin within 24 hours. Principals only and in strict Confidence.

COMBEST ROYALTY COMPANY
Amarillo, Texas

CAMPBELL CONSTRUCTION COMPANY

Cooling Tower Specialist

Repair—Maintenance—Conversions
Distribution & Redistribution Systems

Survey, Recommendations & Proposals on Request.

Phone #2879—Box 13—Duncan, Okla.

BUSINESS CONNECTION
Or Positions Wanted By Two Experienced Oil Men

Executive geologist under 40 thoroughly experienced in acquisition of oil and gas leases, drilling deals, farmouts, purchase of proven oil and gas properties, personnel management, organizing exploration and development programs domestic and foreign, economic analysis experience in oil & gas deals. Geological & law background. Presently employed in executive capacity. Field and research geologist, 30, experienced in all phases of oil business. These two men will serve as a team. Complete offices being set up in Texas with wealth of information covering continental United States. Will relocate provided proper incentive forthcoming. Desire change where financial backing is forthcoming in buying proven production, drilling wildcat wells, buying leases. Will consider new company needing exploration dept. Strong Independent Company or group of individuals needing expert guidance. Fully qualified to manage all operations. Presently ready to get started and have ten million barrels of oil reserves lined up with complete balance of operations grossing one million dollars per year with the oil costing 50 to 75c per bbl. in the ground, plus additional smaller properties. Complete resume and personal interview to qualified inquiries.

Box J-184, The Oil and Gas Journal, Tulsa, Oklahoma.

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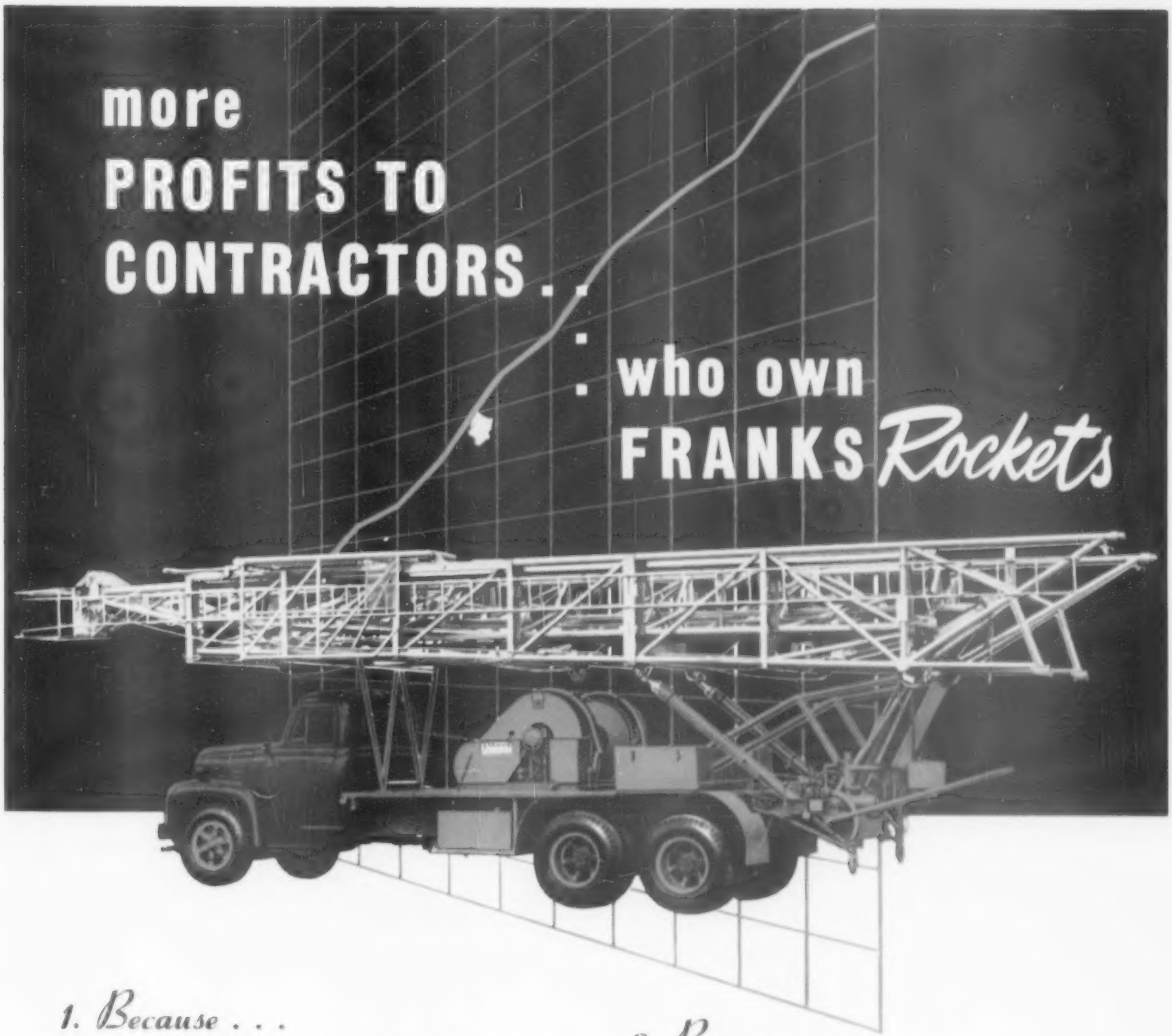

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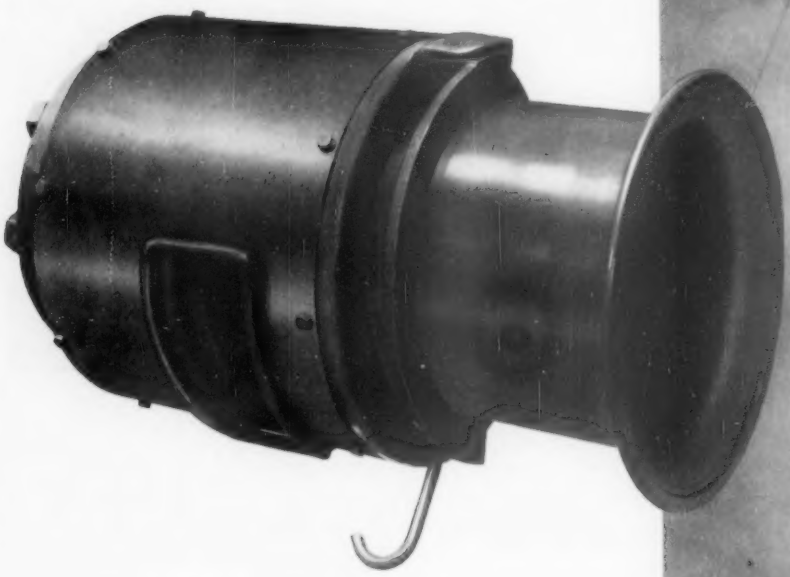

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